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Pediatric infection diseases

Textbook

for medical school students

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Foreword

Infection diseases, especially contagious infection diseases have been mankind challenges since ancient. To succeed in this battle human needs both, control epidemiology of infection diseases and educate students with valuable knowledge. In this text book is systematized the basic information from well know international medical organizations and moderate it for medical school's students as a general level of pediatric infection diseases. With my best wishes , that it receive attention medical school's students.

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Preface

Education is a spark, lighting the darkness of ignorance. Progressing quickly in the study is a aim of this textbook, this is a result of analyze, categorize and structure knowledge given by prestigious health organizations and their experts. Finally it was adapted for students of medical school to be able them to meet a deadline with a basic knowledge on the subject. Student can effortlessly understand the key points of pediatric infection diseases, by giving them theoretical knowledge & practical skills for self-development as asubject specialist afterward.

Liana Siradze pediatrician, MD. PhD. Professor

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The term "germs" refers to the microscopic bacteria, viruses, fungi, and protozoa that can cause disease

Bacteria

Bacteria are tiny, single-celled organisms that get nutrients from their environments. from child or some other living being.

Some bacteria are good for our bodies — they help keep the digestive system in working order and keep harmful bacteria from moving in.

Some bacteria are used to make medicines and vaccines.

But bacteria can cause trouble too, as with cavities, urinary tract infections, ear infections, or strep throat.

Antibiotics are used to treat bacterial infections.

Viruses

even smaller than bacteria. They aren't even a full cell.

They are genetic material (DNA or RNA) packaged inside of a protein coating.

They need to use another cell's structures to reproduce. (such as a person, animal, or plant).

Viruses can only live for a very short time outside other living cells.

For example, viruses in infected body fluids left on surfaces like a doorknob or toilet seat can live there for a short time.

They'll die quickly unless a live host comes along

they've moved into someone's body, spread easily

Fungi

are multicell, plant-like organisms. A fungus gets nutrition from plants, food, and animals in damp, warm environments.

Many fungal infections, such as athlete's foot and yeast infections, are not dangerous in a healthy person. People with weak immune systems (from diseases like HIV or cancer), though, may get more serious fungal infections

Protozoa

are one-celled organisms, like bacteria. But they are bigger than bacteria and contain a nucleus and other cell structures, making them more like plant and animal cells.

So intestinal infections and other diseases they cause, like amebiasis and giardiasis, often spread through contaminated water. Some protozoa are parasites.. For example, the protozoa that causes malaria grows inside red blood cells, eventually destroying them.

Some protozoa are encapsulated in **cysts,** which help them live outside the human body and in harsh environments for long periods of time

Child's Immunizations

Babies are born with protection against some diseases because their mothers pass antibodies (proteins made by the body to fight disease) to them before birth. Breastfed babies continue to get more antibodies in breast milk. But in both cases, the protection is temporary.

Immunization (vaccination) is a way to create immunity to (protection from) some diseases. This is done by using small amounts of a killed or weakened germ that causes the disease.

Germs can be viruses (such as the measles virus) or bacteria (such as pneumococcus). Vaccines stimulate the immune system to react as if there were a real infection. It fends off the "infection" and remembers the germ. Then, it can fight the germ if it enters the body later.

Types of Vaccines

There are a few different types of vaccines. They include:

Attenuated (weakened) live viruses are used in some vaccines such as in the measles, mumps, and rubella (MMR) vaccine.

Killed (inactivated) viruses or bacteria are used in some vaccines, such as in IPV.

Toxoid vaccines contain an inactivated toxin produced by the bacterium. For example, the diphtheria and tetanus vaccines are toxoid vaccines.

Conjugate vaccines (such as Hib) contain parts of bacteria combined with proteins.

The American Academy of Pediatrics (AAP) recommends that kids get combination vaccines (rather than single vaccines) whenever possible. Many vaccines are offered in combination to help reduce the number of shots a child receives.

What Vaccines Do Kids Need?

The following vaccinations and schedules are recommended by the AAP. Some variations are normal, and recommendations change as new vaccines are developed. Your doctor will talk to you about the right vaccinations and schedule for your child.

Recommended vaccinations:

Chickenpox (varicella) vaccine

Diphtheria, tetanus, and pertussis vaccine (DTaP)

Hepatitis A vaccine (HepA)

Hepatitis B vaccine (HepB)

Hib vaccine

Human papillomavirus (HPV) vaccine

Influenza vaccine

Measles, mumps, and rubella vaccine (MMR)

Meningococcal vaccines

Pneumococcal vaccine (PCV)

Polio vaccine (IPV)

Rotavirus vaccine

Vaccine Concerns

Some parents may hesitate to have their kids vaccinated. They have questions or worry that a child might have a serious reaction or get the illness the vaccine prevents. But the components of vaccines are weakened or killed. In some cases, only parts of the germ are used. So they're unlikely to cause any serious illness.

Some vaccines may cause mild reactions, such as soreness where the shot was given or a fever. But serious reactions are rare. The risks of vaccinations are small compared with the health risks of the diseases they're intended to prevent.

Immunizations are one of the best means of protection against contagious diseases.

Immunization Schedule

This schedule of recommended immunizations may vary depending upon where you live, your child's health, the type of vaccine, and the vaccines available.

Some of the vaccines may be given as part of a combination vaccine so that a child gets fewer shots. Talk with your doctor about which vaccines your kids need.

Birth

HepB: Hepatitis B vaccine. Ideally, the first dose is given within 24 hours of birth, but kids not previously immunized can get it at any age. Some low birth weight infants will get it at 1 month or when they're discharged from the hospital.

1–2 months

HepB: Second dose should be given 1 to 2 months after the first dose.

2 months

DTaP: Diphtheria, tetanus, and acellular pertussis vaccine

Hib: *Haemophilus influenzae* type b vaccine

IPV: Inactivated poliovirus vaccine

PCV: Pneumococcal conjugate vaccine

RV: Rotavirus vaccine

4 months

DTaP

Hib

IPV

PCV

RV

6 months

DTaP

Hib: This third dose may be needed, depending on the brand of vaccine used in previous Hib immunizations.

PCV

RV: This third dose may be needed, depending on the brand of vaccine used in previous RV immunizations.

6 months and annually

Influenza (Flu): The flu vaccine is recommended every year for children 6 months and older:

Kids younger than 9 who get the flu vaccine for the first time (or who have only had one dose before July 2019) will get it in 2 separate doses at least a month apart.

Those younger than 9 who have had at least 2 doses of flu vaccine previously (in the same or different seasons) will only need 1 dose.

Kids older than 9 need only 1 dose.

The vaccine is given by injection with a needle (the flu shot) or by nasal spray. Both types of vaccine can be used this flu season (2019–2020) because they seem to work equally well. Your doctor will recommend which to use based on your child's age and general health. The nasal spray is only for healthy people ages 2–49. People with weak immune systems or some health conditions (such as asthma) and pregnant women should **not** get the nasal spray vaccine.

6–18 months

HepB

IPV

12–15 months

Hib

MMR: Measles, mumps, and rubella (German measles) vaccine

PCV

Chickenpox (varicella)

12–23 months

HepA: Hepatitis A vaccine; given as 2 shots at least 6 months apart

15–18 months

DTaP

4–6 years

DTaP

MMR

IPV

Varicella

11–12 years

HPV: Human papillomavirus vaccine, given in 2 shots over a 6- to 12-month period. It can be given as early as age 9. For teens and young adults (ages 15–26 in girls and boys both), it is given in 3 shots over 6 months. It's recommended for both girls and boys to prevent genital warts and some types of cancer.

Tdap: Tetanus, diphtheria, and pertussis booster. Also recommended during each pregnancy a woman has.

Meningococcal conjugate vaccine: And a booster dose is recommended at age 16.

16–18 years

Meningococcal B vaccine (MenB): The MenB vaccine *may* be given to kids and teens in 2 or 3 doses, depending on the brand. Unlike the meningococcal conjugate vaccine, which is recommended, the decision to get the MenB vaccine is made by the teens, their parents, and the doctor.

Special circumstances

HepA can be given as early as 6 months of age to babies who will travel to a place where hepatitis A is common (they will still need routine vaccination after their first birthday). It's also recommended for older kids who did not get it in the past.

The MMR vaccine can be given to babies as young as 6 months old if they will be traveling internationally. These children should still get the recommended routine doses at 12–15 months and 4–6 years of age, but can get the second dose as early as 4 weeks after the first if they will still be traveling and at risk.

The flu vaccine is especially important for kids who are at risk for health problems from the flu. High-risk groups include, but aren't limited to, kids younger than 5 years old and those with chronic medical conditions, such as asthma, heart problems, sickle cell disease, diabetes, or HIV.

Pneumococcal vaccines can be given to older kids (age 2 and up) who have conditions that affect their immune systems, such as asplenia or HIV infection, or other conditions, like a cochlear implant, chronic heart disease, or chronic lung disease.

The meningococcal vaccines can be given to kids as young as 8 weeks old (depending on the vaccine brand) who are at risk for a meningococcal infection, such as meningitis. This includes children with some immune disorders. Kids who live in (or will travel to) countries where meningitis is common, or where there is an outbreak, also should get the vaccine.

Note: An outbreak is when a disease happens in greater numbers than expected in a particular area. If you have questions about vaccinating your family during an outbreak, ask your health care provider or contact your state or local health department.

CDC's National Immunization Program website for more information about vaccinations

Common Questions About Immunizations from parents.

What Do Vaccines Do?

Vaccines work by preparing the body to fight illness. Each contains either a dead or a weakened germ (or parts of it) that causes a particular disease.

The body practices fighting the disease by making antibodies that recognize specific parts of that germ. This permanent or longstanding response means that if someone is ever exposed to the actual disease, the antibodies are already in place and the body knows how to combat it and the person doesn't get sick. This is called **immunity**.

Since the start of widespread vaccinations in the United States, cases of once common childhood illnesses like measles and diphtheria have dropped dramatically. Immunizations have protected millions of kids from dangerous diseases and saved thousands of lives.

In fact, some diseases are so rare now that parents sometimes ask if vaccines for them are even needed. But most diseases that can be prevented by vaccines do still exist in the world, even in the United States, although they happen very rarely.

Will the Immune System Be Weaker By Relying on a Vaccine?

No, the immune system makes antibodies against a germ, like the chickenpox virus, whether it encounters it naturally or is exposed to it through a vaccine. Being vaccinated against one disease does not weaken the immune response to another disease.

Can a Vaccine Give Someone the Disease It's Supposed to Prevent?

It's *impossible* to get the disease from any vaccine made with dead (killed) bacteria or viruses or just part of the bacteria or virus.

Only those immunizations made from weakened (also called **attenuated**) live viruses — like the chickenpox (varicella) and measles-mumps-rubella (MMR) vaccines — could possibly make a child develop a mild form of the disease. But it's almost always *much less severe* than if a child became infected with the disease-causing virus itself. However, for kids with weakened immune systems, such as those being treated for cancer, these vaccines may cause problems.

The risk of disease from vaccination is extremely small. One live virus vaccine that's no longer used in the United States is the oral polio vaccine (OPV). The success of the polio vaccination program has made it possible to replace the live virus vaccine with a killed virus form known as the inactivated polio vaccine (IPV). This change has completely eliminated the possibility of polio disease being caused by immunization in the United States.

Why Should I Have My Child Immunized if All the Other Kids in School Are Immunized?

It is true that a single child's chance of catching a disease is low if everyone else is immunized. But your child is also exposed to people other than just those in school. And if one person thinks about skipping vaccines, chances are that others are thinking the same thing. Each child who isn't immunized gives highly contagious diseases one more chance to spread.

Although vaccination rates are fairly high in the United States, there's no reliable way to know if everyone your child comes into contact with has been vaccinated, particularly now that so many people travel to and from other countries. So the best way to protect your kids is through immunization.

Can Getting So Many Vaccines at One Time Harm My Baby?

Babies have stronger immune systems than you might think, and they can handle far more germs than what they receive from vaccines. In fact, the amount of germs in

vaccines is just a small percentage of the germs babies' immune systems deal with every day.

Sometimes, kids can have a reaction to a vaccine like a mild fever or rash. But the risk of serious reactions is small compared with the health risks associated with the often-serious diseases they prevent, and do not happen because the baby got several vaccines at once.

A lot of consideration and research went into creating the immunization schedule most doctors use, and it has been proven safe time and time again. Still, some parents choose to use alternative schedules (spreading or "spacing out" vaccines) because they're concerned about the number of shots their babies get at each checkup. This is actually more likely to make a baby sick. Studies show that many babies on alternative immunization schedules never get all the vaccines they need.

Plus, alternative schedules can be a real hassle. Spacing out vaccines over more doctor visits means that you'll have to take your child to the doctor — and your child will have to get a shot — more often.

Why Should My Child Get a Painful Shot if Vaccines Aren't 100% Effective?

Few things in medicine work 100% of the time. But vaccines are one of the most effective weapons we have against disease — they work in 85% to 99% of cases. They greatly reduce your child's risk of serious illness (particularly when more and more people are vaccinated) and give diseases fewer chances to take hold in a population.

It can be hard to watch kids get a shot, but the short-term pain is nothing compared with suffering through a potentially deadly bout of diphtheria, whooping cough, or measles.

Why Do Healthy Kids Need to Be Immunized?

Vaccinations are intended to help **keep** healthy kids healthy. Because vaccines work by protecting the body before disease strikes, if you wait until your child gets sick, it will be too late for the vaccine to work. The best time to immunize kids is when they're healthy.

Can Immunizations Cause a Bad Reaction in My Child?

The most common reactions to vaccines are minor and include:
redness and swelling where the shot was given
fever
soreness at the site where the shot was given

In rare cases, immunizations can trigger more serious problems, such as seizures or severe allergic reactions. If your child has a history of allergies to food or medicine, or has had a problem with a vaccine before, let the doctor know before any vaccines are given. Every year, millions of kids are safely vaccinated and very few experience serious side effects.

Research continually improves the safety of immunizations. The American Academy of Pediatrics (AAP) now advises doctors to use a diphtheria, tetanus, and pertussis vaccine that includes only specific parts of the pertussis cell instead of the entire killed cell. This vaccine, called DTaP, has been associated with even fewer side effects.

Do Immunizations or Thimerosal Cause Autism?

No. Numerous studies have found no link between vaccines and autism (a developmental disorder that's characterized by mild to severe impairment of communication and social interaction skills). Likewise, a groundbreaking 2004 report from the Institute of Medicine (IOM) found that **thimerosal** (an organic mercury compound that's been used as a preservative in vaccines since the 1930s) does **not** cause autism.

Still, some parents have opted not to have their children immunized, putting them at great risk of contracting deadly diseases.

The MMR vaccine, especially, has come under fire even though many scientific reports have found no evidence linking the vaccine to autism. In fact, the study that suggested a possible link between autism and the MMR vaccine was retracted in 2004 and the doctor who published it lost his medical license. Even before it was discredited and declared fraudulent, the study was rejected by all major health organizations, including the AAP, the National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO).

There's also no reason to believe that thimerosal is linked to autism, according to the 2004 IOM report. Still, in an effort to reduce childhood exposure to mercury and other heavy metals, thimerosal began being removed from kids' vaccines in 1999. Now, **vaccines for infants and young children contain no or very little thimerosal**. And recent studies have not shown any cognitive and behavioral problems in babies who might have received these thimerosal-containing vaccines.

So what could explain the increased rates of autism in recent years? For one thing, there's a broader definition of autism that can be applied to more kids who show varying degrees of symptoms. A greater awareness of the condition among health professionals also has led to more diagnoses.

And although the number of children diagnosed with autism may be increasing, the rates of MMR vaccination are not. In London, diagnoses of autistic disorders have been on the rise since 1979, but rates of MMR vaccination haven't increased since routine MMR vaccination began in 1988.

Also, the average age of diagnosis of autism has been found to be the same both in children who have *and* who have not received the MMR vaccine. What many researchers are discovering is that subtle symptoms of autism are often present before a child's first birthday — sometimes even in early infancy — but often go unnoticed until the symptoms are more obvious to parents.

Wasn't There a Problem With the Rotavirus Vaccine?

Rotavirus is one of the most common causes of diarrhea in young children. In 1999, a rotavirus vaccine was taken off the market because it was linked to an increased risk for intussusception, a type of bowel obstruction, in babies.

However, two different rotavirus vaccines (RotaTeq and Rotarix) are now available and are very safe. Some studies suggest that they have a very small increased risk for intussusception, but that problem is rare. These vaccines have been shown to prevent most cases of rotavirus infection and almost all of the severe cases.

The vaccine is now on the regular immunization schedule to be given orally to infants as a liquid during standard vaccination visits — RotaTeq at ages 2 months, 4 months, and 6 months, or Rotarix at ages 2 months and 4 months. Your doctor will have the most current information.

Do Vaccines Cause SIDS, Multiple Sclerosis, Or Other Problems?

There are concerns, many of which circulate on the Internet, linking some vaccines to multiple sclerosis, sudden infant death syndrome (SIDS), and other problems. To date, studies have failed to show any connection between immunizations and these conditions. The number of SIDS cases has actually fallen by more than 50% in recent years, whereas the number of vaccines given yearly has continued to rise.

Why Do Kids Need Vaccines for a Disease That's Been Eliminated?

Diseases that are rare or nonexistent in the United States, like measles and polio, still exist in other parts of the world. Doctors continue to vaccinate against them because it's easy to come into contact with illnesses through travel — either when Americans travel abroad or when people who aren't properly immunized come to the United States.

In recent years, there have been measles outbreaks in many different states, even though measles was declared eliminated from the U.S. in 2000. (Elimination means that the disease has not been transmitted continuously for over a year, but it doesn’t mean there aren't outbreaks.) These cases were mostly among people who did not get vaccinated. Other preventable diseases that had recent outbreaks include whooping cough (pertussis) and mumps.

It's only safe to stop vaccinations for a particular disease when that disease has been eradicated worldwide, as with smallpox.

How Long Does Immunity Last After Getting a Vaccine?

A few vaccines, like the two for measles or the series for hepatitis B, may make you immune for your entire life. Others, like tetanus, last for many years but require periodic shots (boosters) for continued protection against the disease.

The whooping cough (pertussis) vaccine also does **not** give lifelong immunity, and that may be one reason why outbreaks still happen. Whooping cough isn't a serious problem for older kids and adults, but it can be for infants and young children. Because of this, teens and adults now receive a pertussis booster along with the tetanus and diphtheria booster (Tdap) — an important step in controlling this infection, particularly for pregnant women and other adults who will be around newborn babies.

It's important to keep a record of vaccinations so the doctor knows when your kids are due for a booster. Also make sure your kids get the flu vaccine each year. Having been immunized last year won't protect someone from getting the flu this year because flu viruses constantly change. The vaccine is updated each year to include the most current strains of the virus.

The flu vaccine reduces the average person's chances of catching the flu by up to 80%. It can't prevent infection by all viruses that can cause flu-like symptoms, though, so being immunized isn't a guarantee that someone won't get sick during flu season. Still, even if someone who's gotten the vaccine has the flu, symptoms usually will be fewer and milder.

How Are Vaccines Studied and Improved?

The FDA's Center for Biologics Evaluation and Research is the government agency that regulates vaccines in the United States. Working with the CDC and the NIH, they continuously research and monitor vaccine safety and effectiveness.

New vaccines are licensed only after thorough laboratory studies and clinical trials, and safety monitoring continues even after a vaccine has been approved. There have been — and will continue to be — improvements (such as those that have already been made to the DTaP and polio vaccines, for example) that will minimize potential side effects and ensure the best possible safety standards.

Where Can I Get Affordable Immunizations for My Child?

Clearly, vaccines are one of the best tools we have to keep kids healthy. But they work best when everyone gets them. Vaccines are now required to be covered by health insurance plans with no charge to the patient. Some insurance plans only cover vaccines when they are given by your doctor or at specific locations. So check with your insurance company to make sure. You can also get inexpensive or free vaccines through many local public health clinics and community health centers, and campaigns to vaccinate kids often hold free vaccination days.

The U.S. government's Vaccines for Children program covers Medicaid-eligible, uninsured Alaskan and Native American populations, and some underinsured kids for routine immunizations up to 18 years of age. The vaccines are provided by the government and administered in a doctor's office. But the doctor's visit itself is **not** covered (unless the child has insurance, including Medicaid). Some public health clinics may cover both the visit and the immunizations.

Where Can I Find Out More About Immunizations?

Read Your Child's Immunizations for details about each recommended immunization. You also can visit the CDC's National Immunization Program website for more information about vaccinations.

And talk with your doctor about which immunizations your kids need. Working together, you can help keep your family healthy.

Common Virus infection in Pediarty

Roseola

Roseola is a viral illness that most commonly affects young kids between 6 months and 2 years old. It's also known **as sixth** disease, exanthem subitum, and roseola infantum.

It is usually marked by several days of high fever, followed by a distinctive rash just as the fever breaks.

Two common, closely related viruses can cause roseola, human herpesvirus (HHV) type 6 and type 7. These viruses belong to the same family as the better-known herpes simplex viruses (HSV), but do not cause the cold sores and genital herpes infections that HSV can cause.

Signs & Symptoms of Roseola

Most children with roseola develop a mild upper respiratory illness, followed by a high fever (often higher than 103°F or 39.5°C) for up to a week. During this time, a child might be fussy or irritable, not eat as much as usual, and may have swollen lymph glands in the neck. So signs develop by following order

At first, child may have:
a sudden high temperature
cold-like symptoms such as a sore throat, runny nose and a cough
loss of appetite
swollen eyelids and swollen glands in their neck
These symptoms last 3 to 5 days, before a rash appears.
The rash:
is made up of pinkish-red spots, patches or bumps
starts on the chest, tummy and back, before spreading to the face, neck and arms
is not usually itchy or uncomfortable
normally fades and disappears within 2 days

More detail on rush: The high fever often ends abruptly, and at about the same time a pinkish-red flat or raised rash starts on the trunk. The rash's spots turn white when touched, and individual spots may have a lighter "halo" around them. The rash usually spreads to the neck, face, arms, and legs.

This fast-rising fever can trigger febrile seizures (convulsions caused by high fevers) in about 10% to 15% of young children who have roseola.

Signs of a febrile seizure include:unconsciousness, 2 to 3 minutes of jerking or twitching in the arms, legs, or face, loss of control of the bladder or bowels

Contagious of Roseola.

Roseola is contagious. The infection spreads when a child with roseola talks, sneezes, or coughs, sending tiny droplets into the air that others can breathe in. The droplets also can land on surfaces; if other children touch those surfaces and then their nose or mouth, they can become infected.

Roseola may be contagious during the fever phase, but does not spread by the time the rash breaks out.

Prevention of Roseola

There is no known way to prevent roseola. But because it affects young kids rather than adults, it's thought that a bout of roseola in childhood may provide some lasting immunity to the illness. Repeat cases of roseola can happen, but are uncommon.

How Long Does Roseola Last?

The fever of roseola lasts from 3 to 7 days, followed by a rash lasting from hours to a few days.

Diagnose of Roseola.

To make a diagnosis, a doctor will take a medical history and do an exam. A diagnosis of roseola is often uncertain until the fever drops and the rash appears, so the doctor may order tests to make sure that the fever is not caused by another type of infection.

Treatment

Roseola usually does not require professional medical treatment. When it does, most treatment is focused on lowering the high fever. Antibiotics can't treat roseola because virusescause it.

Home Treatment- for parents education

Main is to ease a fever. **Never give** child an icy or cold bath or alcohol rubs.

To prevent dehydration from the fever, encourage your child to drink clear fluids such as electrolyte oral replacement solution. Breast milk and formula can help prevent dehydration as well.

For parents if child has roseola

look child or baby at home. The infection should pass within a week.

Do

let your child rest if they feel unwell

make sure they drink lots of fluids

give them children's paracetamol or ibuprofen if a high temperature makes them feel uncomfortable – check the dose on the bottle

Don't

do not cover them up in too many clothes or bedclothes

do not give aspirin to under-16s

do not combine ibuprofen and paracetamol, unless a GP tells you to

do not give paracetamol to a child under 2 months

do not give ibuprofen to a child under 3 months or under 5kg

do not give ibuprofen to children with asthma

Call emergency if your child has any of these symptoms:

acting confused, slurred speech or not making sense

blue, pale or blotchy skin, lips or tongue

a rash that does not fade when you roll a glass over it, the same as meningitis

difficulty breathing, breathlessness or breathing very fast

How long will child have to stay home?

Roseola is thought to be most contagious when a child has a high temperature.

Once the high temperature has passed you do not need to keep your child away from nursery if they're feeling well enough to attend. There's no need to wait until the rash disappears.

Measles, Mumps, and Rubella Diseases and How to Protect Against Them

Measles causes fever, rash, cough, runny nose, and red, watery eyes. Complications can include ear infection, diarrhea, pneumonia, brain damage, and death.

Mumps causes fever, headache, muscle aches, tiredness, loss of appetite, and swollen salivary glands. Complications can include swelling of the testicles or ovaries, deafness, inflammation of the brain and/or tissue covering the brain and spinal cord (encephalitis/meningitis) and, rarely, death.

Rubella, causes fever, sore throat, rash, headache, and red, itchy eyes. If a woman gets rubella while she is pregnant, she could have a miscarriage or her baby could be born with serious birth defects.

You can protect against these diseases with safe, effective vaccination

5-3 A child with measles displaying the characteristic re
tern on his face and body. (From Kremer, JR, Muller C

Measles

Measles is a very contagious respiratory infection. It causes a total-body skin rash and flu-like symptoms. Measles is rare in the United States thanks to widespread immunization. But millions of cases happen worldwide every year.

Measles (also called **rubeola)** is caused by a single-stranded, enveloped RNA virus with 1 serotype. It is classified as a member of the genus Morbillivirus in the Paramyxoviridae family. **Humans are the only natural hosts of measles virus.**

Signs & Symptoms of Measles

The first symptoms of a measles infection are usually a hacking cough, runny nose, high fever, and red eyes&People often call conjunctivitis “pink eye” because it can cause the white of the eye to take on a pink or red color. Symptoms of pink eye canvary but typically include redness or swelling of the white of the eye.

Kids also may have **Koplik's spots** (small red spots with blue-white centers) inside the mouth before the rash starts, **2-3 days after symptoms begin.**

Figure 246-2 Koplik spots on the buccal mucosa during the 3rd day of rash. *(From Centers for Disease Control and Prevention (CDC): Public health image library, image #4500. Available at: http://phil.cdc.gov/phil/details.asp)*

The rash breaks out 3–5 days after symptoms start, sometimes along with a high fever up to 104°F (40°C). The red or reddish-brown rash usually begins as flat red spots on the forehead. It spreads to the rest of the face, then down the neck and torso to the arms, legs, and feet. The fever and rash slowly go away after a few days.

Complications of Measles can be serious. Children younger than 5 years of age and adults older than 20 years of age are more likely to suffer from complications. Common complications are ear infections and diarrhea. Serious complications include pneumonia and encephalitis.

Groups at Risk of Measles Complications

Measles can be serious in all age groups. However, there are several groups that are more likely to suffer from measles complications:

- Children younger than 5 years of age
- Adults older than 20 years of age
- Pregnant women
- People with compromised immune systems**,** such as from leukemia or HIV infection

Common Complications

Ear infections occur in about one out of every 10 children with measles and can result in permanent hearing loss.

Diarrhea is reported in less than one out of 10 people with measles.

Some people may suffer from severe complications, such as pneumonia and encephalitis. They may need to be hospitalized and could die.

As many as 1 out of every 20 children with measles gets pneumonia, the most common cause of **death from measles in young children**.

bout 1 child out of every 1,000 who get measles will develop encephalitis (swelling of the brain) that can lead to convulsions and can **leave the child deaf or with intellectual**

Nearly 1 to 3 of every 1,000 children who become infected with measles will **die from respiratory and neurologic complications**.

Measles may cause pregnant women who have not had the MMR vaccine to **give birth prematurely, or have a low-birth-weight baby**.

describes measles complications in more depth.

Long-term Complications, such as subacute sclerosing panencephalitis (SSPE) is a very rare, but fatal disease of the central nervous system that results from a measles virus infection acquired earlier in life.SSPE generally develops 7 to 10 years after a person has measles, even though the person seems to have fully recovered from the illness.

The risk of developing SSPE may be higher for a person who gets measles before they are 2 years of age. Measles can be dangerous, especially for babies and young children.

Table 246-1	Complications By Age for Reported Measles Cases, United States, 1987-2000			
		No. (%) of Persons with Complication		
COMPLICATION	OVERALL (67,032 CASES WITH AGE INFORMATION)	<5 YR (N = 28,730)	5-9 YR (N = 6,492)	10-19 YR (N = 18,580)
Any	19,480 (29.1)	11,883 (41.4)	1,173 (18.1)	2,369 (12.8)
Death	177 (0.3)	97 (0.3)	9 (0.1)	18 (0.1)
Diarrhea	5,482 (8.2)	3,294 (11.5)	408 (6.3)	627 (3.4)
Encephalitis	97 (0.1)	43 (0.2)	9 (0.1)	13 (0.1)
Hospitalization	12,876 (19.2)	7,470 (26.0)	612 (9.4)	1,612 (8.7)
Otitis media	4,879 (7.3)	4,009 (14.0)	305 (4.7)	338 (1.8)
Pneumonia	3,959 (5.9)	2,480 (8.6)	183 (2.8)	363 (2.0)

From Perry RT, Halsey NA: The clinical significance of measles: a review, Clin Infect Dis 189(Suppl 1):S4–S16, 2004.

Measles is **very contagious**. In fact, 9 out of 10 people who aren't vaccinated for measles will get it if they are near an infected person.

Measles spreads when people breathe in or have direct contact with virus-infected fluid. It can pass through droplets sprayed into the air when someone with measles sneezes or coughs. Someone exposed to the virus usually shows symptoms 7–14 days later.

People with measles can spread the disease from 4 days before the rash starts until about 4 days after that. They're most contagious while they have a fever, runny nose, and cough. Those with weak immune systems due to other conditions (like HIV and AIDS) can spread the measles virus until they recover.

Diagnosis and Laboratory Testing

Healthcare providers should consider measles in patients presenting with febrile rash illness and clinically compatible measles symptoms, especially if the person recently traveled internationally or was exposed to a person with febrile rash illness. Healthcare providers should report suspected measles cases to their local health department within 24 hours.

Laboratory confirmation is essential for all sporadic measles cases and all outbreaks. Detection of measles-specific IgM antibody in serum and measles **RNA by real**-time polymerase chain reaction (RT-PCR) in a respiratory specimen are the most common methods for confirming measles infection. Healthcare providers should obtain both a serum sample and a throat swab (or nasopharyngeal swab) from patients suspected to have measles at first contact with them. Urine samples may also contain virus, and when feasible to do so, collecting both respiratory and urine samples can increase the likelihood of detecting measles virus.

Molecular analysis can also be conducted to determine the genotype of the measles virus. Genotyping is used to map the transmission pathways of measles viruses. The genetic data can help to link or unlink cases and can suggest a source for imported

cases. Genotyping is the only way to distinguish between wild-type measles virus infection and a rash caused by a recent measles vaccination.

Measles' Treatment

There is no specific antiviral therapy for measles. Medical care is supportive and to help relieve symptoms and address complications such as bacterial infections.

Give a non-aspirin fever medicine. To help manage symptoms: give your child plenty of fluids, encourage extra rest. Kids with measles should be closely watched by a doctor

Severe measles cases among children, such as those who are hospitalized, should be treated with vitamin A. Vitamin A should be administered immediately on diagnosis and repeated the next day. The recommended age-specific daily doses are

50,000 IU for infants younger than 6 months of age

100,000 IU for infants 6–11 months of age

200,000 IU for children 12 months of age and older

In some cases, measles can lead to other problems, such as:

- ear infections
- croup
- diarrhea
- pneumonia
- encephalitis

Children with measles should be kept away from others for 4 days after their rash appears. For those with a weak immune system, this should continue until they make a full recovery and all symptoms are gone.

A measles infection can last for several weeks. Symptoms usually start 7–14 days after someone is exposed to the virus.

Measles' Prevention

The best way to protect your kids is to make sure they're immunized against measles.

For most kids, measles protection is part of the measles-mumps-rubella vaccine (MMR) or measles-mumps-rubella-varicella vaccine (MMRV) given when they're 12 to 15 months old and again when they're 4 to 6 years old.

The vaccine can be given to babies as young as 6 months old if they will be traveling internationally. Talk to your doctor to see when the vaccine is needed.

Vaccination

Widespread immunization has made measles rare in the U.S. But outbreaks do still happen. An outbreak is when a disease happens in greater numbers than expected in

a particular area. Measles outbreaks have been increasing worldwide, mostly due to people not being vaccinated.

It's important for all kids who can get the vaccine to get it on time. At-risk people (such as those with weak immune systems) can't get the vaccine. But when a lot of other people are immunized against a disease, it protects them, prevents the disease from spreading, and helps prevent outbreaks.

If you were born after 1957 you need at least one dose of measles vaccine unless a laboratory confirmed that you had past measles infection or are immune to measles. Certain adults may need 2 doses. Adults who are going to be in a setting that poses a high risk for measles transmission should make sure they have had two doses separated by at least 28 days. These adults include

students at post-high school education institutions, healthcare personnel, international traveler

At highest risk during a measles outbreak are:

- infants who aren't old enough to get the vaccine
- pregnant women
- people with poor nutrition or weak immune systems

Doctors can give an injection of measles antibodies (called **immune globulin**) to at-risk people who are exposed to measles. It's most effective when given within 6 days of contact. These antibodies can either prevent measles or make symptoms less severe.

The measles vaccine also can help protect unvaccinated people from getting sick after exposure to measles if they get it within 3 days.

For parents

Call the doctor right away if you think that your child has measles. Also call if your child was around someone who has measles, especially if child:

- is an infant
- is taking medicines that suppress the immune system
- has tuberculosis, cancer, or a disease that affects the immune system

Measles Cases in 2019From January 1 to December 31, 2019, 1,282* individual cases of measles were confirmed in 31 states. Of these cases, 128 were hospitalized and 61 reported having complications, including pneumonia and encephalitis**.**

All measles cases were caused by measles wild-type D8 or B3.

Evidence of Immunity

Acceptable presumptive evidence of immunity against measles includes at least one of the following:

written documentation of adequate vaccination:

one or more doses of a measles-containing vaccine administered on or after the first birthday for preschool-age children and adults not at high risk

two doses of measles-containing vaccine for school-age children and adults at high risk, including college students, healthcare personnel, and international travelers

- laboratory evidence of immunity*
- laboratory confirmation of measles
- birth before 1957

Healthcare providers should not accept verbal reports of vaccination without written documentation as presumptive evidence of immunity. For additional details about evidence of immunity criteria, see Table 3 in Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP).

*People who have negative or equivocal results **for measles IgG** should be vaccinated or revaccinated. In some cases it is not possible to vaccinate a patient, and you may need to test them with a second line diagnostic assay to determine whether they are immune to measles. Because the sensitivity and specificity of commercial **measles IgG assays vary**, state public health departments can provide information on appropriate second line assays.

Vaccination

Measles can be prevented with measles-containing vaccine, which is primarily administered as the combination measles-mumps-rubella (MMR) vaccine. The combination measles-mumps-rubella-varicella (MMRV) vaccine can be used for children aged 12 months through 12 years for protection against measles, mumps, rubella and varicella. Single-antigen measles vaccine is not available.

One dose of MMR vaccine is approximately 93% effective at preventing measles; two doses are approximately 97% effective. Almost everyone who does not respond to the measles component of the first dose of MMR vaccine at age 12 months or older will respond to the second dose. Therefore, the second dose of MMR is administered to address primary vaccine failure [1]

Vaccine Recommendations

Children

CDC recommends routine childhood immunization for MMR vaccine starting with the first dose at 12 through 15 months of age, and the second dose at 4 through 6 years of age or at least 28 days following the first dose. The measles-mumps-rubella-varicella (MMRV) vaccine is also available to children 12 months through 12 years of age; the minimum interval between doses is three months.

Students at post-high school educational institutions

Students at post-high school educational institutions without evidence of measles immunity need two doses of MMR vaccine, with the second dose administered no earlier than 28 days after the first dose.

Adults

People who are born during or after 1957 who do not have evidence of immunity against measles should get at least one dose of MMR vaccine

International travelers

People 6 months of age or older who will be traveling internationally should be protected against measles. Before traveling internationally,

Isolation

Infected people should be isolated for four days after they develop a rash; airborne precautions should be followed in healthcare settings. Regardless of presumptive immunity status, all healthcare staff entering the room should use respiratory protection consistent with airborne infection control precautions (use of an N95 respirator or a respirator with similar effectiveness in preventing airborne transmission). Because of the possibility, albeit low, of MMR vaccine failure in healthcare providers exposed to infected patients, they should all observe airborne precautions in caring for patients with measles. The preferred placement for patients who require airborne precautions is in a single-patient airborne infection isolation room (AIIR).

People without evidence of immunity who have been exempted from measles vaccination for medical, religious, or other reasons and who do not receive appropriate PEP within the appropriate timeframe should be excluded from affected institutions in the outbreak area until 21 days after the onset of rash in the last case of measles.

Table 245-2 Antiviral Therapies for Non-HIV Clinical Conditions

VIRUS	CLINICAL SYNDROME	ANTIVIRAL AGENT OF CHOICE	ALTERNATIVE ANTIVIRAL AGENTS
Influenza A	Treatment	Oseltamivir (>1 yr old)	Rimantadine Amantadine
	Prophylaxis	Oseltamivir (>1 yr old)	Amantadine Rimantadine Zanamivir (>7 yr old)
Influenza B	Treatment	Oseltamivir	Zanamivir (>7 yr old)
Respiratory syncytial virus	Bronchiolitis or pneumonia in high-risk host	Ribavirin aerosol	
Cytomegalovirus (CMV)	Congenital CMV infection	Ganciclovir (IV)	Valganciclovir (if oral therapy appropriate; long-term oral valganciclovir investigational but may improve developmental and hearing outcomes)
	Retinitis in AIDS patients	Valganciclovir	Ganciclovir Cidofovir Foscarnet Ganciclovir ocular insert
	Pneumonitis, colitis; esophagitis in immunocompromised patients	Ganciclovir (IV)	Foscarnet Cidofovir Valganciclovir

ANTIVIRAL	TRADE NAME	MECHANISM OF ACTION
Acyclovir	Zovirax	Inhibits viral DNA polymerase
Adefovir	Hepsera	Nucleotide reverse transcriptase inhibitor
Amantadine	Symmetrel	Blocks M2 protein ion channel
Cidofovir	Vistide	Inhibits viral DNA polymerase
Famciclovir	Famvir	Inhibits viral DNA polymerase
Fomivirsen	Vitravene	Phosphorothioate oligonucleotide inhibits viral replication via antisense mechanism
Foscarnet	Foscavir	Inhibits viral DNA polymerase and reverse transcriptase at pyrophosphate-binding site
Ganciclovir	Cytovene	Inhibits viral DNA polymerase
Idoxuridine	Herplex	Inhibits viral DNA polymerase
Interferon-α	Intro-A (interferon-α2b) Roferon-A (interferon-α2a) Infergen (interferon alfacon-1)	Produces multiple effector proteins that exert antiviral effects; also directly interacts with immune system components
Interferon-α2b plus ribavirin	Rebetron	Not established
Lamivudine	Epivir	Inhibits viral DNA polymerase and reverse transcriptase
Oseltamivir	Tamiflu	Neuraminidase inhibitor; interference with deaggregation and release of viral progeny
Pegylated interferon	PEG-Intron (α2b), Pegasys (α2a)	Same as interferon
Penciclovir	Denavir	Inhibits viral DNA polymerase
Ribavirin	Virazole, Rebetol, Copegus	Interference with viral messenger RNA
Rimantadine	Flumadine	Blocks M2 protein ion channel
Trifluridine	Viroptic	Inhibits viral DNA polymerase
Valacyclovir	Valtrex	Same as acyclovir
Valganciclovir	Valcyte	Same as ganciclovir
Vidarabine	ara-A	Inhibits viral DNA polymerase (and to lesser extent, cellular DNA polymerase)
Zanamivir	Relenza	Neuraminidase inhibitor; interference with deaggregation and release of viral progeny

FDA-APPROVED COMBINATION THERAPIES

Interferon-α2b + ribavirin	Rebetron (Intron-A plus Rebetol)
Interferon-α2a + ribavirin	Roferon-A + ribavirin
Pegylated interferon-α2b + ribavirin	PEG-Intron + Rebetol
Pegylated interferon-α2a + ribavirin	Pegasys + Copegus

*See Chapter 276 for antiretroviral drugs.

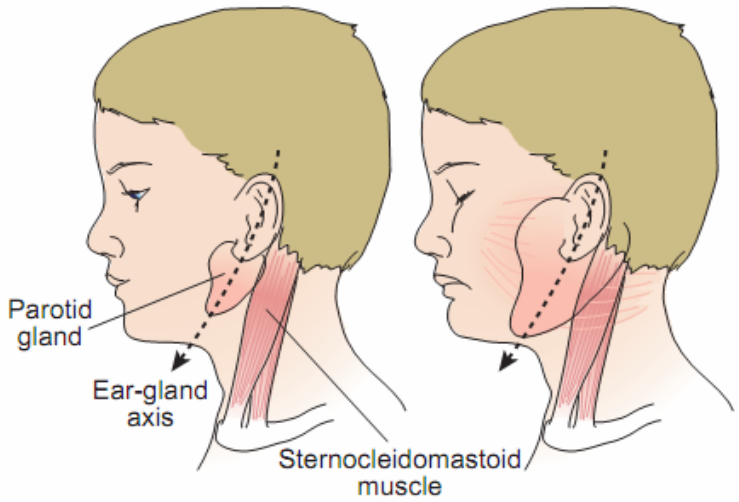

Figure 248-2 Schematic of a parotid gland infected with mumps *(right)* compared with a normal gland *(left)*. An imaginary line bisecting

Mumps

Mumps is an infection caused by a paramyxovirus, a member of the Rubulavirus family. The average incubation period for mumps is 16 to 18 days, with a range of 12 to 25 days

These viruses are a common source of infection, particularly in children It can infect many parts of the body, but is best known for causing swelling of the parotid glands. These glands, which make saliva, are in front of the ear, around the jaw.

Mumps used to be a common childhood illness, especially in kids 5 to 9 years old. It's much rarer now, thanks to the mumps vaccine.

Signs & Symptoms of Mumps

Many kids have no symptoms, or very mild symptoms that feel like a cold, fever, headache, muscle aches, tiredness, Loss of appetite, feel tired, achy, and generally unwell.. Symptoms typically appear 16-18 days after infection, but this period can range from 12–25 days after infection. Some people who get mumps have no symptoms at all and may not know they have the disease.

When you get mumps, the virus moves from your respiratory tract (your nose, mouth and throat) into your parotid glands (saliva-producing glands found either side of your face), where it begins to reproduce.

Within a couple days, salivary glands often referred to as **parotitis,** can swell and get painful. This makes the cheeks look puffy. The pain gets worse when the child swallows, talks, chews, or drinks acidic juices (like orange juice). Sometimes one swells a few days before the other.

The virus can also enter your cerebrospinal fluid (CSF), which is the fluid that surrounds and protects your brain and spine. Once the virus has entered the CSF, it can spread to other parts of your body, such as your brain, pancreas, testicles (in boys and men) and ovaries (in girls and women).

This rare cases cause **more severe complications**:encephalitis or meningitis, orchitis (inflammation of the testicles)oophoritis (inflammation of the ovaries), pancreatitis (inflammation of the pancreas), hearing loss.

Most people with mumps recover completely within two weeks.

Mumps' Contagious

Mumps spreads in tiny drops of fluid when someone with the virus sneezes, coughs, talks, or laughs. Contact with objects they use — like dirty tissues, straws, or drinking glasses — also can pass the virus. If they don't wash their hands, any surface they touch can spread mumps to others who touch it.

Someone with mumps is most contagious from 2 days before symptoms start to 5 days after they end. Anyone who is infected can pass the disease, even if they don't have

symptoms A person with mumps should limit their contact with others during this time. For example, stay home from school and do not attend social events.

Epidemiology

Mumps happens most often in school-age kids and college students. Outbreaks are rare, but can happen. An outbreak is when many people from one area come down with the same disease. Experts are looking into why outbreaks still happen and ways to prevent them.

Most people who get mumps never get it again.

Laboratory Tests to Diagnose Mumps

RT-PCR and viral culture are used to confirm mumps infection. Buccal swabs are most commonly used for RT-**PCR testing, but urine and CSF may** also be used in specific situations**. IgM serology** can also be used to aid in diagnosing mumps infection. A patient's vaccination status and timing of specimen collection are important for interpreting laboratory results. A negative test result does not rule out mumps infection.

Mumps' Treatment

Treatment for mumps is focused on relieving symptoms until body's immune system fights off the infection. There's no specific medical treatment for mumps **virus.**

- The infection usually passes within a week or two.
- In the meantime, the measures below may help.
- **get plenty of bed rest** until symptoms have passed
- **take over-the-counter painkillers**.

drink plenty of fluids, but avoid acidic drinks such as fruit juice as these can irritate your parotid glands, like orange juice, grapefruit juice, or lemonade. water is usually the best fluid to drink

- Eat foods that don't require a lot of chewing.
- Mumps is caused by a virus, so it can't be treated with antibiotics.
- Most children with mumps recover fully in about 2 weeks.

Mumps' Prevention

The best way to protect kids is to make sure they're immunized against mumps.

mumps protection is part of the measles-mumps-rubella vaccine (MMR) or measles-mumps-rubella-varicella vaccine (MMRV). They get these when they're 12–15 months old and again when they're 4–6 years old.

Sometimes people who have been vaccinated still get mumps. But their symptoms will be much milder than if they had not gotten the vaccine.

During a mumps outbreak, doctors may recommend more shots of the MMR vaccine for some people who are more likely to get mumps. Your doctor will have the most current information.

Possible Risks of the MMR Vaccine

Serious problems such as allergic reactions are rare. Mild to moderate side effects can happen, such as rash, fever, swollen cheeks, febrile seizures, and mild joint pain

For Parents education -Mumps Virus Still Around

Mumps occurs in the world wild, Call the doctor right away if your child has mumps and: gets a severe headache, has a stiff neck, and the MMR (measles-mumps-rubella) vaccine is the best way to prevent the disease. Consequently, **parents should check** the child's immunization record regularly or contact the doctor to see whether child has already received the MMR vaccine.

- Parents should get child vaccinated on time; visit the immunization scheduler for newborn to 6-year-old children.
- Remember that some preteens, teens, and adults also need MMR vaccine; review the preteens and teen schedule and the adult schedule.
- Get an additional vaccine dose if your health department recommends it to a group you are part of during an outbreak.
- Recognize the signs and symptoms of mumps.
- Let your doctor know right away if you think you or someone in your family may have mumps.

Complications of Mumps.

Mumps can occasionally cause complications, especially in adults.

- Inflammation of the testicles (orchitis) in males who have reached puberty; this may lead
- to a decrease in testicular size (testicular atrophy)
- inflammation of the ovaries (oophoritis) and/or breast tissue (mastitis)
- inflammation in the pancreas (pancreatitis)
- inflammation of the brain (encephalitis)
- inflammation of the tissue covering the brain and spinal cord (meningitis) deafness
- Neither inflammation of the testicles nor inflammation of the ovaries caused bymumps has been shown to lead to infertility. Complications can occur in the absence of parotitis and occur less frequently in vaccinated patients. Some complications of mumps are known to **occur more frequently among adults** than children.

Figure 248-3 A child with mumps showing parotid swelling. *(From the Centers for Disease Control and Prevention [CDC]: Public health image library [PHIL], image #4491. Available at: http://phil.cdc.gov/phil/home.asp)*

Orchitis occurs in approximately 20–30% of unvaccinated and 6–7% of vaccinated postpubertal male mumps patients. In 60% to 83% of males with mumps orchitis, only one testis is affected. Mumps orchitis may result in testicular atrophy and hypofertility. Among adolescent and adult female mumps patients in the United States, rates of oophoritis and mastitis have been ≤1%. However, these complications may be more difficult to recognize and are likely underreported. Pancreatitis, deafness, meningitis, and encephalitis have been reported in less than 1% of cases in recent U.S. outbreaks. Cases of nephritis and myocarditis and other sequelae, including paralysis, seizures, cranial nerve palsies, and hydrocephalus, in mumps patients have been reported but are very rare.

Rubella (German Measles)

Figure 247-3 Rash of rubella.

Rubella — commonly known as German measles or 3-day measles — is an infection that mostly affects the skin and lymph nodes. It is caused by the rubella virus (**not** the same virus that causes measles).

Rubella spreads when people breathe in virus-infected fluid, such as the droplets sprayed into the air when a person with rubella sneezes or coughs, or share food or drink with someone who's infected. It also can pass through a pregnant woman's bloodstream to infect her unborn child.

It's a generally mild disease in children; the primary medical danger of rubella is the infection of pregnant women because it can cause congenital rubella syndrome in developing babies.

Before a vaccine against rubella became available in 1969, rubella epidemics happened every 6-9 years, usually among kids 5 to 9 years old, along with many cases of congenital rubella. Thanks to immunization, there are far fewer cases of rubella and congenital rubella.

Most rubella infections today appear in young, non-immunized adults rather than in kids. In fact, experts estimate that 10% of young adults are currently susceptible to rubella, which could pose a danger to any children they might have someday.

Symptoms

Rubella infection may begin with 1-2 days of mild fever (99-100°F, 37.2–37.8°C) and swollen, tender lymph nodes, usually in the back of the neck or behind the ears. A rash then begins on the face and spreads downward. As it spreads, it usually clears on the face.

The rubella rash is often the first sign of illness that a parent notices. It can look like many other viral rashes, appearing as either pink or light red spots, which may merge to form evenly colored patches. The rash can itch and lasts up to 3 days. As the rash clears, the affected skin might shed in very fine flakes.

Other symptoms of rubella (these are more common in teens and adults) can include headache, loss of appetite, mild conjunctivitis (inflammation of the lining of the eyelids and eyeballs), a stuffy or runny nose, swollen lymph nodes in other parts of the body, and pain and swelling in the joints (especially in young women). Many people with rubella have few or no symptoms.

Rubella in a pregnant woman can cause congenital rubella syndrome, with potentially devastating consequences for the developing fetus. Children who are infected with rubella before birth are at risk for growth problems; intellectual disability; defects of the heart and eyes; deafness; and liver, spleen, and bone marrow problems.

Contagiousness

The rubella virus passes from person to person through tiny drops of fluid from the nose and throat through sneezing and coughing. People who have rubella are most contagious from 1 week before to 1 week after the rash appears. Someone who is infected but has no symptoms can still spread the virus.

Infants who have congenital rubella syndrome can shed the virus in urine and fluid from the nose and throat for a year or more and may pass the virus to people who have not been immunized.

If a woman is infected with rubella while she is pregnant, she can pass it to her developing baby and cause serious harm.

Incubation and Duration

The incubation period for rubella is 14–23 days, with an average incubation period of 16–18 days. This means that it can take 2–3 weeks for a child to get rubella after being exposed to someone with the disease.

The rubella rash usually lasts 3 days. Lymph nodes may remain swollen for a week or more, and joint pain can last for more than 2 weeks. Children who have rubella usually recover within 1 week, but adults may take longer.

Treatment

Rubella cannot be treated with antibiotics because they do not work against viral infections. Unless there are complications, rubella will get better on its own.

Any pregnant woman who has been exposed to rubella should contact her obstetrician immediately. Rubella can cause a miscarriage or serious birth defects in a developing baby if a woman is infected while she is pregnant.

Rubella usually is mild in kids, who often can be cared for at home. Monitor child's temperature and be alert if the fever climbs too high.

To ease minor discomfort, you can give child anti fever and pain release: **over-the-counter** medicine**.**

Complications

Up to 70% of women who get rubella may experience arthritis; this is rare in children and men. In rare cases, rubella can cause serious problems, including brain infections and bleeding problems.

The most serious complication from rubella infection is the harm it can cause a pregnant woman’s developing baby. If an unvaccinated pregnant woman gets infected with rubella virus she can have a miscarriage, or her baby can die just after birth. Also, she can pass the virus to her developing baby who can develop serious birth defects such as—heart problems, loss of hearing and eyesight, intellectual disability, and liver or spleen damage.

Serious birth defects are more common if a woman is infected early in her pregnancy, especially in the first trimester

Diagnose of Rubbela

Collect throat (best source), nasal, or urine specimens for viral detection by **polymerase chain reaction (PCR**) testing and molecular typing, and blood for serologic testing.

Polymerase chain reaction (PCR)

Sometimes called "molecular photocopying," the polymerase chain reaction (PCR) is a fast and inexpensive technique used to "amplify" - copy - small segments of DNA. Because significant amounts of a sample of DNA are necessary for molecular and genetic analyses, studies of isolated pieces of DNA are nearly impossible without PCR amplification.

Often heralded as one of the most important scientific advances in molecular biology, PCR revolutionized the study of DNA to such an extent that its creator, Kary B. Mullis, was awarded the Nobel Prize for Chemistry in 1993.

What is PCR used for?

Once amplified, the DNA produced by PCR can be used in many different laboratory procedures. For example, most mapping techniques in the Human Genome Project (HGP) relied on PCR.

PCR is also valuable in a number of laboratory and clinical techniques, including DNA fingerprinting, detection of bacteria or viruses (particularly AIDS), and diagnosis of genetic disorders

Evidence of Immunity
Acceptable presumptive evidence of immunity against rubella includes at least one of the following:

written documentation of vaccination with one dose of live rubella virus-containing vaccine administered on or after the first birthday,

- laboratory evidence of immunity,
- laboratory confirmation of rubella disease, or
- birth before 1957

Healthcare providers should not accept verbal reports of vaccination without written documentation as presumptive evidence of immunity.

Prevention

Rubella can be prevented by the rubella vaccine. Widespread immunization against rubella is critical to controlling the spread of the disease, thereby preventing birth defects caused by congenital rubella syndrome.

CDC recommends routine childhood immunization for MMR vaccine The vaccine is usually given to children at 12–15 months of age as part of the scheduled measles-mumps-rubella (MMR) immunization. A second dose of MMR usually is given at 4–6 years of age. As with all immunization schedules, there are important exceptions and special circumstances. For example, if child will be traveling outside the United States, the vaccine can be given as early as 6 months of age.

The rubella vaccine should not be given to pregnant women or to a woman who may become pregnant within 1 month of receiving the vaccine. If you women thinking about becoming pregnant, that have to be immune to rubella through a blood test or proof of immunization. If she is not immune, you should receive the vaccine at least 1 month before you become pregnant.

Pregnant women who are not immune should avoid anyone who has the illness and should be vaccinated after delivery so that they will be immune during any future pregnancies.

Isolation

Patients with rubella should be isolated for 7 days after they develop rash. In settings where pregnant women may be exposed, outbreak control measures should begin as soon as rubella is suspected and should not be postponed until laboratory confirmation of cases.

People at risk who cannot readily provide acceptable evidence of rubella immunity should be considered susceptible and should be vaccinated. People without evidence of immunity who are exempt from rubella vaccination for medical, religious, or other reasons should be excluded from affected institutions in the outbreak area until 23 days after the onset of rash in the last case of rubella. Unvaccinated people who receive MMR vaccine as part of rubella outbreak control may immediately return to school provided all people without documentation of rubella immunity have been excluded.

For parents. Call doctor if your child appears to be getting sicker than the mild course of symptoms described above.

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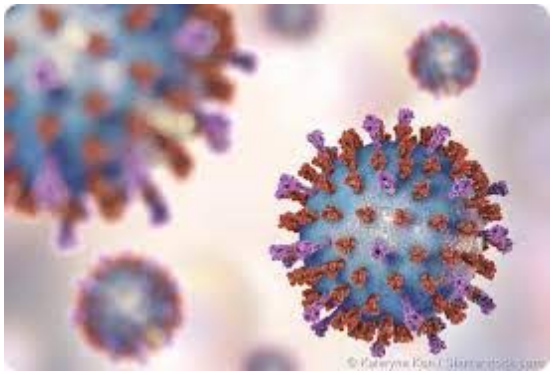
Respiratory Syncytial Virus



Respiratory syncytial virus (RSV) is a major cause of respiratory illness in young children. The virus infects the lungs and breathing passages.

Kids with RSV might have cold symptoms, such as:

- a stuffy or runny nose
- sore throat
- mild headache
- cough
- fever
- a general ill feeling

RSV infections in premature babies, infants, and kids with diseases that affect the lungs, heart, or immune system, can lead to other, more serious illnesses such as pneumonia or bronchiolitis.

Respiratory syncytial virus is highly contagious. It spreads through droplets containing the virus when someone coughs or sneezes. It also can live on surfaces (like counters or doorknobs) and on hands and clothing. So people can get it if they touch something that's contaminated.

RSV can spread quickly through schools and childcare centers. Babies often get it when older kids carry the virus home from school and pass it to them. Almost all kids have had RSV at least once by the time they're 2 years old.

RSV infections often happen in epidemics that last from late fall through early spring. Respiratory illness caused by RSV — such as bronchiolitis or pneumonia — usually lasts about a week, but some cases may last several weeks.

Doctors usually **diagnose respiratory syncytial** virus by taking a medical history and doing an exam. In most healthy kids, they don't need to distinguish განასხვაოRSV from a common cold.

But if a child has other health conditions, the doctor might want to make a specific RSV diagnosis. In that case, the virus is identified by testing nasal fluids. The sample is collected either with a cotton swab or by suction through a bulb syringe.

Respiratory Syncytial Virus' Treatment

Most cases of respiratory syncytial virus are mild and don't need medical treatment from doctors. Antibiotics aren't used because RSV is a virus and antibiotics work only against bacteria. Sometimes, doctors give **medicine to help open airways.**

RSV infection can be more serious in babies, though. Some might need treatment in a hospital. There, they can be watched closely and get fluids, if needed, and treatment for any breathing problems.

- Make child as comfortable as possible.
- Allow time for recovery.
- Provide plenty of fluids. Babies may not feel like drinking, so offer fluids in small amounts often.
- Avoid hot-water and steam humidifiers, which can be hazardous and can cause scalding. If you use a cool-mist humidifier, clean it daily with household bleach to prevent mold and bacteria growth.

- If child is uncomfortable and too young to blow his or her own nose, use
- a nasal aspirator (or bulb syringe) to remove sticky nasal fluids.
- Treat fever using a non-aspirin fever medicine

Respiratory Syncytial Virus' Prevention

Because RSV can be easily spread by touching infected people or surfaces, washing hands well and often is key in stopping it. Wash your hands after being around someone who has cold symptoms. And school-age kids who have a cold should keep away from younger siblings — especially babies — until their symptoms pass.

To prevent serious RSV-related respiratory disease, at-risk infants can get a monthly injection of a medicine with RSV antibodies during peak RSV season (roughly November to April).

- **Palivizumab** is a monoclonal antibody recommended by the American Academy of Pediatrics (AAP) to be administered to high-risk infants and young children likely to benefit from immunoprophylaxis.
- **Palivizumab** is given in monthly intramuscular injections during the RSV season, which generally occurs during fall, winter, and spring in most locations in the United States.

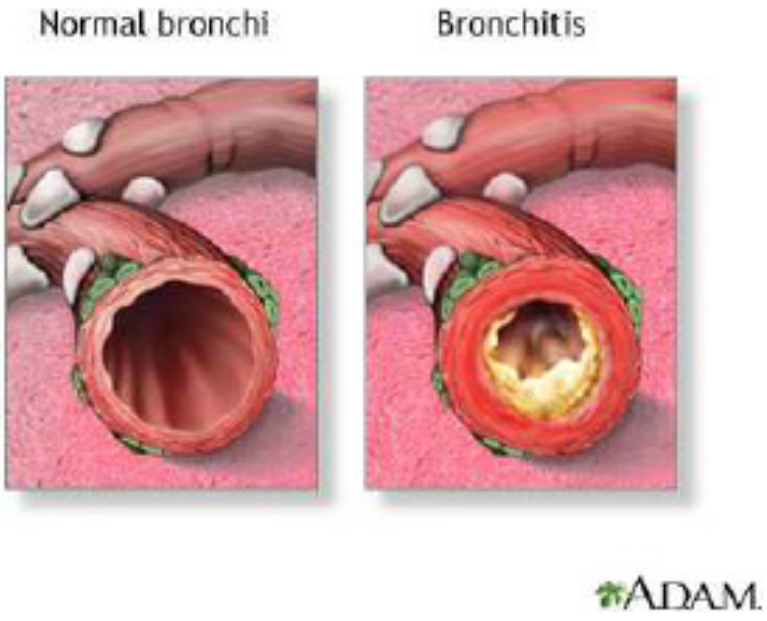
ForProphylaxis and High-Risk Infants and Young Children will need injections each RSV season until they're no longer at high risk for severe RSV infection.

Parents education

Call the doctor if your child has:

- a high fever and doesn't look well
- a thick nasal discharge
- a cough that gets worse or produces yellow, green, or gray mucus
- signs of dehydration
- if infant is very cranky, or refuses to breastfeed or bottle-feed.
- has trouble breathing or is breathing very rapidly
- is very drowsy
- has lips or fingernails that look blue

Bronchiolitis



Bronchiolitis is an infection of the respiratory tract. It happens when tiny airways called bronchioles infected with a virus. They swell and fill with mucus, which can make breathing hard.

Bronchiolitis is more common during the winter months. Most cases can be managed at home.

Signs & Symptoms of Bronchiolitis

The first symptoms of bronchiolitis are usually the same as those of a cold:

- stuffy nose and congestion
- runny nose
- cough
- fever

Usually, symptoms get better on their own. But sometimes the cough might get worse and a child may start wheezing or have noisy breathing.In very young infants, irritability, decreased activity, and apnea may be the only symptoms of infection
Bronchiolitis:most often affects infants and young children because their small airways can easily get blocked

- is most common during the first 2 years of life, especially in very young babies
- is more common in premature babies, children with lung or heart problems, and kids with weak immune systems
- Kids who go to childcare, have siblings in school, or are around secondhand smoke have a higher risk for bronchiolitis.
- Older kids and adults can get bronchiolitis, but the infection usually is mild.

What Causes Bronchiolitis?

Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis. Sometimes, the common cold and the flu also can cause it.

How Is Bronchiolitis Diagnosed?

When they suspect bronchiolitis, doctors listen to the child's chest and check oxygen levels with a pulse oximeter.

Usually, no tests are needed. The doctor may use a swab to get a sample of mucus from the nose for testing. This helps with identifying the type of virus causing the problem.

A chest X-ray might be done if the child's oxygen level is low or the doctor suspects pneumonia.

Treatment

Most cases of bronchiolitis are mild and don't need specific medical treatment. Antibiotics can't help because viruses cause bronchiolitis. Antibiotics work only against bacterial infections.

Treatment focuses on easing symptoms. Kids with bronchiolitis need time to recover and plenty of fluids. Make sure your child gets enough to drink by offering fluids in small amounts often.

You can use a cool-mist vaporizer or humidifier in your child's room to help loosen mucus in the airway and relieve cough and congestion. Clean it as recommended to prevent buildup of mold or bacteria. Avoid hot-water and steam humidifiers, which can cause scalding.

To clear nasal congestion, try a nasal aspirator and saline (saltwater) nose drops. This can be especially helpful before feeding and sleeping.

Key fact of treatment bronchiolitis:

- Usually patients worsen between 3-5 days, followed by improvement.
- Antibiotics are not helpful and should not be used.
- Nasal suctioning is mainstay of therapy.
- Neither **albuterol nor nebulized** racemic epinephrine should be administered to infants and children with bronchiolitis who are not hospitalized.
- There is no evidence to support routine suctioning of the lower pharynx or larynx (deep suctioning).
- There is **no role for** corticosteroids, ribavirin, or chest physiotherapy in the management of bronchiolitis.

Overall

Most cases of bronchitis go away on their own. The infection simply has to run its course over several weeks. Treatment options your doctor may suggest are:

- Resting and getting plenty of fluids
- Drinking lots of water, which helps loosen chest congestion
- A cough suppressant and/or pain reliever
- A humidifier or steam

Antibiotics are not effective for treating viral infections, but if there is a suspicionon bacterial infection, may prescribe one.

Babies who have trouble breathing, are dehydrated, or seem very tired should be checked by a doctor immediately. Those with serious symptoms may need care in a hospital to get fluids and, help with breathing.

Contagious

Viruses that cause bronchiolitis spread easily through the air when someone coughs or sneezes. Germs can stay on hands, toys, doorknobs, tissues, and other surfaces. People can be contagious for several days or even weeks

Bronchiolitis usually lasts about 1–2 weeks. Sometimes it can take several weeks for symptoms to go away.

Bronchiolitis often is a mild illness. But sometimes it can cause severe symptoms. When it does, kids need treatment in a hospital.

Get medical care right away if a baby:

- has fast, shallow breathing and you can see the belly moving up and down quickly
- has labored breathing, when the areas below the ribs, between the ribs, and/or in the neck sink in as a child breathes in
- has flaring nostrils
- is very fussy and can't be comforted

- is very tired or won't wake up for feedings
- has a poor appetite or isn't feeding well
- fewer wet diapers or peeing less than usual
- has a blue color to the lips, tongue, or nails
- You know your child best. Call your doctor right away if something doesn't seem right.

Prevention

Washing hands well and often is the best way to prevent the spread of viruses that can cause bronchiolitis and other infections.

Also:

- Keep infants away from anyone who has a cold or cough.
- Keep kids away from secondhand smoke.
- Keep toys and surfaces clean.

Surfactants are compounds that lower the surface tension between two liquids, between a gas and a liquid, or between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants.

- Usually patients worsen between 3-5 days, followed by improvement.
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- Nasal suctioning is mainstay of therapy.
- Neither albuterol nor nebulized racemic epinephrine should be administered to infants and children with bronchiolitis who are not hospitalized.
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Pneumonia

Key facts

- **Pneumonia accounts for 15% of all deaths of children under 5 years old, killing 808 694 children in 2017.**
- **Pneumonia can be caused by viruses, bacteria, or fungi.**
- **Pneumonia can be prevented by immunization, adequate nutrition, and by addressing environmental factors.**
- **Pneumonia caused by bacteria can be treated with antibiotics, but only one third of children with pneumonia receive the antibiotics they need.**

Pneumonia is a form of acute respiratory infection that affects the lungs. The lungs are made up of small sacs called alveoli, which fill with air when a healthy person breathes. When an individual has pneumonia, the alveoli are filled with pus and fluid, which makes breathing painful and limits oxygen intake.

Pneumonia is the single largest infectious cause of death in children worldwide. Pneumonia killed 808 694 children under the age of 5 in 2017, accounting for 15% of all deaths of children under five years old. Pneumonia affects children and families everywhere, but is most prevalent in South Asia and sub-Saharan Africa. Children can be protected from pneumonia, it can be prevented with simple interventions, and treated with low-cost, low-tech medication and care.

Causes

Pneumonia is caused by a number of infectious agents, including viruses, bacteria and fungi. The most common are:

- *Streptococcus pneumoniae* – the most common cause of bacterial pneumonia in children;
- *Haemophilus influenzae* type b (Hib) – the second most common cause of bacterial pneumonia;
- respiratory syncytial virus is the most common viral cause of pneumonia;
- in infants infected with HIV, *Pneumocystis jiroveci* is one of the most common causes of pneumonia, responsible for at least one quarter of all pneumonia deaths in HIV-infected infants.

Transmission

Pneumonia can be spread in a number of ways. The viruses and bacteria that are commonly found in a child's nose or throat, can infect the lungs if they are inhaled. They may also spread via air-borne droplets from a cough or sneeze. In addition, pneumonia may spread through blood, especially during and shortly after birth. More research needs to be done on the different pathogens causing pneumonia and the ways they are transmitted, as this is of critical importance for treatment and prevention.

Presenting features

The presenting features of viral and bacterial pneumonia are similar. However, the symptoms of viral pneumonia may be more numerous than the symptoms of bacterial pneumonia. In children under 5 years of age, who have cough and/or difficult breathing, with or without fever, pneumonia is diagnosed by the presence of either fast breathing or

lower chest wall indrawing where their chest moves in or retracts during inhalation (in a healthy person, the chest expands during inhalation). Wheezing is more common in viral infections.

Very severely ill infants may be unable to feed or drink and may also experience unconsciousness, hypothermia and convulsions.

Risk factors

While most healthy children can fight the infection with their natural defences, children whose immune systems are compromised are at higher risk of developing pneumonia. A child's immune system may be weakened by malnutrition or undernourishment, especially in infants who are not exclusively breastfed.

Pre-existing illnesses, such as symptomatic HIV infections and measles, also increase a child's risk of contracting pneumonia.

The following environmental factors also increase a child's susceptibility to pneumonia:

- indoor air pollution caused by cooking and heating with biomass fuels (such as wood or dung)
- living in crowded homes
- parental smoking.

Treatment

Pneumonia should be treated with antibiotics. The antibiotic of choice is amoxicillin dispersible tablets. Most cases of pneumonia require oral antibiotics, which are often prescribed at a health centre. These cases can also be diagnosed and treated with inexpensive oral antibiotics at the community level by trained community health workers. Hospitalization is recommended only for severe cases of pneumonia.

Prevention

Preventing pneumonia in children is an essential component of a strategy to reduce child mortality. Immunization against Hib, pneumococcus, measles and whooping cough (pertussis) is the most effective way to prevent pneumonia.

Adequate nutrition is key to improving children's natural defences, starting with exclusive breastfeeding for the first 6 months of life. In addition to being effective in preventing pneumonia, it also helps to reduce the length of the illness if a child does become ill.

Addressing environmental factors such as indoor air pollution (by providing affordable clean indoor stoves, for example) and encouraging good hygiene in crowded homes also reduces the number of children who fall ill with pneumonia.

In children infected with HIV, the antibiotic cotrimoxazole is given daily to decrease the risk of contracting pneumonia

Respiratory Distress Syndrome

Respiratory distress syndrome (RDS) is a breathing problem that affects newborns, mostly those who are born more than 6 weeks early. The earlier or more premature a baby is born, the more likely the baby will develop RDS.

Many babies with milder symptoms get better in 3–4 days. Those who are very premature may take longer to recover.

Symptoms of Respiratory Distress Syndrome

Within minutes or hours of being born, a baby with RDS will have breathing problems. If untreated, these problems get worse over time.

Symptoms of RDS include:

- fast breathing
- noisy breathing or grunting
- retractions (a tugging in of the muscles between the ribs, under the ribcage, and at the neck) while trying to breathe
- a blue tint in the lips, nail beds, and skin from lack of oxygen, called cyanosis

What Happens in Respiratory Distress Syndrome?

RDS happens when a baby's lungs don't make enough of a fatty substance called surfactant (ser-FAK-tent).

Surfactant is made in the last few weeks of pregnancy. It helps tiny air sacs in the lungs called **alveoli** (al-VEE-oh-lye) open more easily. These sacs fill with air when a baby breathes after birth. Surfactant also helps keep the alveoli open when air leaves the lungs.

- When a baby with RDS tries to breathe:
- many of the alveoli cave in and can't open
- oxygen can't get to the blood
- carbon dioxide can't leave the body
- If untreated, in time this can damage a baby's brain and other vital organs.

Respiratory Distress Syndrome's Diagnose

Health care providers will suspect RDS in a premature baby who has trouble breathing and needs oxygen soon after birth. A chest X-ray of the lungs can confirm the diagnosis.

Treatment of **Respiratory Distress Syndrome**

To help prevent respiratory distress syndrome, doctors can give steroid medicines to pregnant women who are likely to deliver their babies early (before 37 weeks of gestation). Steroids help the baby's lungs mature and make more surfactant before the baby is born.

Doctors will give oxygen to a baby who has signs of RDS and breathing trouble. If breathing problems continue, the baby may need **continuous positive airway pressure (CPAP)**. With CPAP:

The baby wears a mask or a nasal cannula that's connected to a machine.

The machine sends a stream of air or oxygen into the lungs through the nose.

CPAP opens the alveoli, supplies oxygen, and prevents the alveoli from collapsing. A baby who continues to have signs of respiratory distress or trouble maintaining a good oxygen level may need more support with a **breathing machine** or **ventilator**.

Babies with RDS may need treatment with surfactant. Doctors give **surfactant through a** breathing tube right into the lungs.

Babies with RDS get treatment in a neonatal intensive care unit (NICU). There, a team of experts cares for these newborns, including:

- doctors who specialize in newborn care -neonatologists
- skilled nurses and neonatal nurse practitioners
- respiratory therapists, who help with breathing machines

Many babies start to get better within 3 to 4 days, as their lungs start to **make surfactant on their own**. They'll start to breathe easier, look comfortable, need less oxygen, and can be weaned from the support of CPAP or a ventilator. Some babies — especially very premature babies — need longer treatment until they can breathe on their own.

For Parents

Respiratory support with oxygen and a ventilator helps newborn babies with respiratory distress. But long-term use can damage a premature baby's lungs. Some babies born

very early need oxygen support for a long time, leading to a condition called bronchopulmonary dysplasia (BPD)

Surfactant Administration in the NICU

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Aim

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Introduction

Pulmonary surfactant is a complex mixture of phospholipids and proteins that creates a cohesive surface layer over the alveoli which reduces surface tension and maintains alveolar stability therefore preventing atelectasis. Surfactant deficiency is a recognized cause of respiratory distress syndrome in the preterm neonate. Secondary surfactant deficiency also contributes to acute respiratory morbidity in late-preterm and term neonates with meconium aspiration syndrome, pulmonary haemorrhage, and pneumonia/sepsis. Many clinical trials have demonstrated that surfactant replacement therapy is a safe, effective and beneficial treatment as it significantly reduces respiratory morbidity (air leaks, pulmonary interstitial emphysema), ventilatory requirements and mortality in these neonates.

Aim

The aim of this guideline is to outline **the principles of surfactant replacement therapy** and the safe administration of surfactant in neonates in the Butterfly ward - Newborn Intensive Care Unit (NICU)

Definition of Terms

Neonate – infant less than 28 days old

Surfactant - complex and highly surface active material composed of lipids and proteins which is found in the fluid lining the alveolar surface of the lungs, which serves to reduce alveolar surface tension

RDS – respiratory distress syndrome

FiO_2 - fraction of inspired oxygen

Assessment

Clinical indications

Surfactant replacement therapy should be considered in:

- neonates with clinical and radiographic evidence of RDS
- neonates at risk of developing RDS (e.g. <32 weeks or low birth weight <1300g)
- neonates who are intubated, regardless of gestation, and requiring FiO_2 >40%
- Surfactant replacement therapy may be considered in:
- Severe meconium aspiration syndrome with severe respiratory failure – may improve oxygenation and reduce the need for extracorporeal membrane oxygenation (ECMO)
- Pulmonary haemorrhage with clinical deterioration
- Severe respiratory syncytial virus-induced respiratory failure - may improve gas exchange and respiratory mechanics and shorten the duration of invasive mechanical ventilation

Dosing

The RCH NICU (Butterfly ward) uses poractant alfa (Curosurf) which is a natural porcine surfactant.

Refer to medication resources for dosing information: Lexicomp, MIMS Online, AMH Children's Dosing Companion

Management&Administration

- Prepare equipment/supplies:
- Continuous cardiovascular monitoring equipment
- Transcutaneous CO_2 monitor (TCM) or end tidal CO_2 monitor ($etCO_2$) if appropriate
- Surfactant
- Size 5 Fr feeding tube
- 3ml or 5ml syringe (dose dependent)
- Large gauge needle (18g, 19g or 20g)
- Alcohol swab 70%
- Sterile towel or drape
- Tape measure
- Sterile scissors
- Emergency equipment: Neopuff and mask, suction

Surfactant administration is a two-person procedure. It should be performed by at least one medical practitioner or a neonatal nurse practitioner (NNP) who administers the surfactant and one registered nurse as the assistant

Record baseline observations: heart rate, respiration rate, oxygen saturation, TCO_2/$etCO_2$, plus a blood gas if required

Ensure and confirm correct position of the endotracheal tube (ETT) via chest x-ray prior to giving surfactant. Auscultation of the chest for equal bilateral air entry confirmed by a NICU fellow or consultant is an additional method of confirming ETT placement.

If neonate is not intubated (eg. a premature neonate on continuous positive airway pressure (CPAP)), an in-out intubation will be performed to administer the surfactant (INSURE technique – Intubation, Surfactant then Extubation). Refer to the guideline on elective intubation.

Check and prepare emergency equipment at bedside (e.g. Neopuff, suction). If performing intubation, also prepare intubation drugs, laryngoscope with appropriate blade size, appropriate size ETT, and Pedicap/CO_2 detector.

- Ensure patency of ETT. Suction ETT as necessary prior to administration.
- Slowly warm the vial of surfactant to room temperature before administration
- Administering medical practitioner performs hand hygiene and dons sterile gloves.

Using surgical aseptic technique, cut a sterile 5 fg feeding tube to the length so that the tip lies 1 cm above the end of the endotracheal tube. This ensures that the surfactant is administered intra-tracheal. Curosurf should not be instilled into a main stem bronchus.

Slowly withdraw a little over the required dose into a 3 or 5 mL plastic syringe using a large-gauge needle. Attach the pre-cut 5 Fr catheter to the syringe, prime or fill the catheter with surfactant to the end. Discard excess surfactant through the catheter so that only the dose to be given remains in the syringe.

Ensure bed is flat. Place the neonate in supine position. There is no evidence to support the practice of placing the neonate in multiple positions during administration.

Assistant disconnects the ETT from the ventilator.

Medical practitioner or NNP to administer the surfactant via the pre-cut 5 Fr catheter in a single bolus dose as quickly as the neonate tolerates. The total dose is usually given less than a minute.

Surfactant can occlude the ETT and it may be necessary to cease administration until the tube is cleared and chest wall movement resumes

Reconnect ETT to ventilator as soon as possible. If neonate was on CPAP, positive pressure ventilation is given via the Neopuff. Holding the ETT upright may facilitate surfactant drainage and minimize reflux up the ventilator circuit

- Ventilator support or inspired oxygen may need to be temporarily increased.
- Medical practitioner/NNP to remain at bedside until the neonate is stable.

Post-administration

Marked improvements may occur within minutes of administration. Ventilation settings will need to be continually assessed and adjusted post administration to avoid hyperoxygenation or exposure to excessive peak inspiratory pressures.

Extubation may be considered for some neonates (INSURE technique – Intubation, Surfactant then Extubation) particularly the premature neonates who were on CPAP prior to administration, and responded well to the surfactant administration.

At high ventilator rates (> 40) regurgitation of surfactant may occur in the expiratory circuit, this can be remedied by holding the ETT upright for a few minutes post administration and/or by reducing the ventilator rate.

Monitor neonate's vital signs closely every 10 minutes for 30 minutes then resume normal frequency of monitoring. A repeat blood gas may be necessary 30-60 minutes post administration.

Do not suction airways for 1 hour after surfactant instillation unless signs of significant airway obstruction occur

Note and report changes in non-pulmonary haemodynamics that may indicate significant changes - particularly in the very premature and/or unwell patient

Potential complications and management

During administration, transient bradycardia, oxygen desaturation and ETT blockage can occur – temporarily stop surfactant administration, provide ventilation or oxygen as necessary, and resume administration after patient is stable

ETT obstruction – if suspected, observe saturations and chest wall movement. Call for medical assistance if obstruction is not alleviated and ventilation is impaired

Pneumothorax – can occur due to sudden changes in pulmonary compliance if ventilation settings are not appropriately changed

Pulmonary haemorrhage – notify medical officer immediately. Ensure the PEEP remains above 5cm H_2O

Special considerations

Storage and handling: Surfactant is stored in a refrigerator at +2 to +8^{o}C. Surfactant vial should be slowly warmed to room temperature and gently turned upside down in order to obtain a uniform suspension. Do not shake the vial. Use the appropriate sized vial for the prescribed volume and discard unused portion immediately after use. Unopened, unused vials of surfactant suspension that have warmed to room temperature can be returned to refrigerated storage within 24 hours for future use. Do not warm to room temperature and return to refrigerated storage more than once. Protect from light.

Infection control: Ensure hand hygiene is performed, surgical aseptic technique is used and equipment is kept sterile/clean to minimize risk of infection

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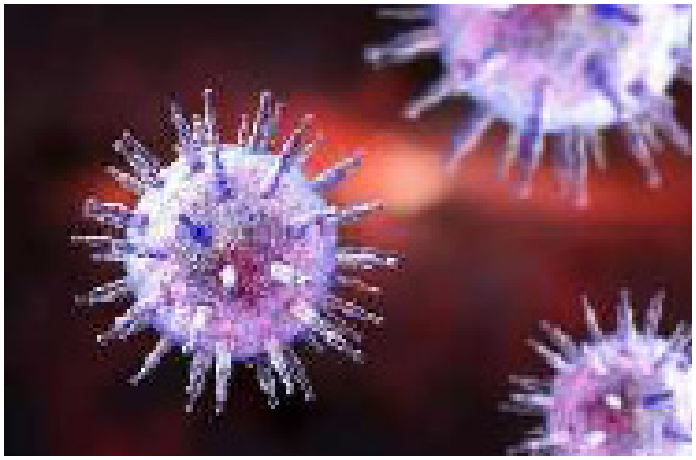
Mononucleosis (Mono)



Mononucleosis (mono) is a viral infection that causes a sore throat and fever. Cases often happen in teens and young adults. It goes away on its own after a few weeks of rest.

Mononucleosis, or **infectious mononucleosis**, usually is caused by the Epstein-Barr virus (EBV). Most kids are exposed to EBV at some point while growing up. Infants and young kids infected with EBV usually have very mild symptoms or none at all. But infected teens and young adults often develop the symptoms that define mono.

CDC Epstein-Barr virus, or EBV, is one of the most common human viruses in the world. It spreads primarily through saliva. EBV can cause infectious mononucleosis, also calledmono, and other illnesses. Most people will get infected with EBV in their lifetime and will not have any symptoms. Mono caused by EBV is most common among teens and adults.

Other viruses, such as cytomegalovirus, can sometimes cause a mono-like illness too.

Signs & Symptoms of Mononucleosis

Signs of mono usually show up about 1–2 months after someone is infected with the virus. Its most common symptoms are sometimes mistaken for strep throat or the flu. These include:

- fever
- sore throat with swollen tonsils that may have white patches
- swollen lymph nodes (glands) in the neck

- being very tired
- A person also can have:
- headaches
- sore muscles
- weakness
- belly pain with a larger-than-normal liver or spleen (an organ in the upper left part of the belly)
- skin rash
- loss of appetite

CDC Nervous System

EBV infection can affect a person's brain, spinal cord, and nerves.

It can cause conditions such as—

- Viral meningitis (swelling of the tissues that cover the brain and spinal cord)
- Encephalitisexternal icon (swelling of the brain)
- Optic neuritisexternal icon (swelling of the eye nerve)
- Transverse myelitisexternal icon (swelling of the spinal cord)
- Facial nerve palsiesexternal icon (paralysis of facial muscles)
- Guillain-Barré syndrome (an immune system disease)
- Acute cerebellar ataxiaexternal icon (sudden uncoordinated muscle movement)
- Hemiplegia (paralysis on one side of the body)
- Sleep disorders
- Psychosesexternal icon
- Hematological System

EBV infection can affect a person's blood and bone marrow. The virus can cause the body to produce an excessive number of white blood cells called lymphocytes (lymphocytosis).

EBV can also weaken the immune system, making it more difficult for the body to fight infection.

- Examples of some of these conditions include—
- Neutropenia with secondary infections
- Hemophagocytic syndrome (hemophagocytic lymphohistiocytosis)
- Acquired hypogammaglobulinemia
- X-linked lymphoproliferative disease

Mono is contagious.

It spreads from person to person through contact with saliva (spit). It's nicknamed "the kissing disease" because it can spread through kissing. It also spreads through coughing and sneezing, or when people share something with spit on it (like a straw, drinking glass, eating utensil, or toothbrush).

Mono can also spread through sexual intercourse and blood transfusions, but this is much less common.

People who've been infected carry the virus for life, even after symptoms stop and even if they had no symptoms. The virus is then "dormant," or inactive. Sometimes the dormant virus "wakes up" and finds its way into a person's saliva. This means that they can be contagious from time to time, even when they have no symptoms.

Mono's Diagnose

To diagnose mono, doctors do an exam to check for things like swollen tonsils and an enlarged liver or spleen, common signs of the infection. Sometimes the doctor will do a blood test.

Mono's Treatment

The best treatment for mono is plenty of rest and fluids, especially early in the illness when symptoms are most severe. There is no specific medicine for mono, but acetaminophen or ibuprofen can help to relieve fever and aching muscles. Antibiotics will not help, because they're only effective against bacteria. Someone with mono who takes an antibiotic often ends up getting a rash.

CDC Prevention & Treatment

There is no vaccine to protect against EBV infection. You can help protect yourself by not kissing or sharing drinks, food, or personal items, like toothbrushes, with people who have EBV infection.

There is no specific treatment for EBV. However, some things can be done to help relieve symptoms, including

- drinking fluids to stay hydrated
- getting plenty of rest
- taking over-the-counter medications for pain and fever

Mono symptoms usually go away within 2 to 4 weeks. In some teens, though, the tiredness and weakness can last for months.

Mono's Prevention

There is no vaccine to protect against the Epstein-Barr virus. But you can help protect your kids from mono by making sure that they avoid close contact with anyone who has it.

Many people who have mono won't have symptoms, but they can still pass it to others. So kids should wash their hands well and often, and not share drinks or eating utensils with others, even people who seem healthy.

For parents

Mono can make the spleen swell for a few weeks or longer. An enlarged spleen can rupture, causing pain and bleeding inside the belly, and needs emergency surgery. So doctors recommend that kids who have mono avoid contact sports for at least a month after symptoms are gone. Your child should stay away from rough play, heavy lifting, and any strenuous activities until the doctor says it's OK.

In most cases, mono symptoms go away in a matter of weeks with plenty of rest and fluids. If they seem to linger or get worse, or if you have any other questions, call your doctor.

Colds

The common cold is a contagious viral infection of the upper respiratory tract.

Most adults catch a cold from time to time, but kids can get eight colds per year or more. They're the top reason kids visit the doctor and miss school.

Causes of Cold

Most colds are caused by rhinoviruses carried in invisible droplets in the air or on things we touch. These viruses can get into the protective lining of the nose and throat, setting off an immune system reaction that can cause a sore throat, headache, and trouble breathing through the nose.

Dry air — indoors or outside — can lower resistance to infection by the viruses that cause colds. So can being a smoker or being around someone who smokes. Smokers are more likely to catch a cold than people who don't smoke, and their symptoms probably will be worse and last longer, and can even lead to bronchitis or pneumonia.

But despite some old wives' tales, not wearing a jacket or sweater when it's chilly, sitting or sleeping in a draft, and going outside while your hair's wet **do not** cause colds.

Signs & Symptoms of Cold

The first symptoms of a cold are often a tickle in the throat, a runny or stuffy nose, and sneezing. Kids with colds also might feel very tired and have a sore throat, cough, headache, mild fever, muscle aches, and loss of appetite. Mucus from the nose may become thick yellow or green.

Colds are the most common infectious disease in the United States. They're very contagious, especially in the first 2 to 4 days after symptoms begin. They can even spread for a couple of weeks after someone starts feeling sick.

Colds spread through person-to-person contact or by breathing in virus particles, which can travel up to 12 feet through the air when someone with a cold coughs or sneezes. Touching the mouth or nose after touching a contaminated surface can also spread a cold.

Cold symptoms usually appear 2 or 3 days after exposure to a source of infection. Most colds clear up within 1 week, but some last a bit longer.

Diagnose

Your doctor won't be able to identify the specific virus causing cold symptoms, but can examine your child's throat and ears and take a throat culture to make sure the symptoms aren't from another condition that may need treatment. If symptoms get worse instead of better after 3 days or so, the problem could be strep throat, sinusitis, pneumonia, or bronchitis, especially if your son or daughter smokes.

If symptoms last for more than a week, appear at the same time every year, or happen when your child is around pollen, dust, or animals, an allergy could be to blame. Kids who have trouble breathing or wheeze when they catch a cold could have asthma.

Colds' Treatment

Colds will clear up on their own without specific medical treatment. Medicine can't cure a cold, but can ease symptoms like muscle aches, headache, and fever.

Many experts now believe that there's usually no reason to give over-the-counter (OTC) decongestants and antihistamines to any child younger than 6. There's little proof that these medicines work, and decongestants can cause hallucinations, irritability, and irregular heartbeats, particularly in infants.

Common cold or non-specific upper respiratory tract infection (URI) treatment. By CDC

- Management of the common cold, nonspecific URI, and acute cough illness should focus on symptomatic relief. Antibiotics should not be prescribed for these conditions.
- There is potential for harm and no proven benefit from over-the-counter cough and cold medications in children < 6 years. These substances are among the top 20 substances leading to death in children <5 years.
- Low-dose inhaled corticosteroids and oral prednisolone do not improve outcomes in children without asthma

Colds' Prevention

Because so many viruses cause colds, there isn't a vaccine to protect against them. To help avoid catching one, kids should:

- steer clear of anyone who has a cold
- avoid secondhand smoke
- wash their hands well and often, especially after blowing their noses
- sneeze or cough into a tissue or their elbow, not into their hands
- not share towels, drinking glasses, or eating utensils with someone who has a cold
- not pick up other people's used tissues

Experts aren't sure whether taking extra zinc or vitamin C can limit how long cold symptoms last or how severe they become, but large doses taken every day *can* cause negative side effects. Studies on herbal remedies, like echinacea, are either negative or aren't conclusive. Few good scientific studies of these treatments have been done in kids.

Talk to your doctor before you give your child any herbal remedy or more than the recommended daily allowance (RDA) of any vitamin or supplement.

For parents

To help ease cold discomfort, you can:

- put saline (saltwater) drops in the nostrils to relieve nasal congestion
- run a cool-mist humidifier to increase air moisture
- dab petroleum jelly on the skin under the nose to soothe rawness
- give hard candy or cough drops to relieve sore throat (only for kids older than 6)
- run a warm bath or use a heating pad to soothe aches and pains
- run a hot shower to create a steam-filled bathroom where your child can sit to help clear stuffiness

What about chicken soup? There's no real proof that eating it can cure a cold, but sick people have been swearing by it for more than 800 years. Chicken soup contains a mucus-thinning amino acid called cysteine, and some research shows that chicken soup helps control congestion-causing white cells, called neutrophils.

The best plan, though, is not to worry about whether to "feed a cold" or "starve a fever." Just make sure your child eats when hungry and drinks plenty of fluids like water or juice to help replace the fluids lost during a fever or from mucus production.

Always call the doctor if you think your child might have more than a cold, your child gets worse instead of better, or if your child has any of these symptoms:

- coughing up a lot of mucus

- shortness of breath
- unusual lethargy/tiredness
- inability to keep food or liquids down or poor fluid intake
- increasing headache or facial or throat pain
- severely painful sore throat that interferes with swallowing
- fever of 103°F (39.3°C) or higher, or a fever of 101°F (38.0°C) or higher that lasts for more than a day
- chest or stomach pain
- swollen glands (lymph nodes) in the neck
- earache

Like most viral infections, colds just have to run their course. Getting plenty of rest and drinking lots of fluids — juice and water — can help your child feel better while on the mend.

Keeping up regular activities like going to school probably won't make a cold any worse. But it *will* increase the likelihood that the cold will spread to classmates or friends. So you might want to put some daily routines aside until your child is feeling better

Cold Sores

Cold sores are small painful blisters that can appear around the mouth, face, or nose. Cold sores (or **fever blisters**) are very common. They usually go away on their own within 1 to 2 weeks.

Clinical manifestation

Cold sores first form blisters on the lips, around the mouth, and sometimes inside the mouth. The blisters then become sores, which can make eating painful. They're filled with fluid, but crust over and form a scab before they go away.

Sometimes the virus causes redness and swelling of the gums, fever, muscle aches, a generally ill feeling, and swollen neck glands.

After a child first gets HSV-1, the virus can lie quietly in the body without causing any symptoms. But it can wake up again later from things like:

- a fever
- sunlight
- cold weather
- menstrual periods
- stress, like before a big test at school

When the virus reactivates, it can cause tingling and numbness around the mouth before blisters appear.

Etiology of Cold Sores

The **herpes simplex virus type 1 (HSV-1) causes cold sore**s. This is a different virus from herpes simplex virus type 2 (HSV-2). HSV-2 causes lesions in the genital area called genital herpes. Even though **HSV-1 typically causes sores around the mouth** and HSV-2 causes genital sores, these viruses can cause sores in either place.

Figure 252-1 Clustered perioral vesicles and erosions in an infant with primary herpetic gingivostomatitis. *(From Schachner LA, Hansen RC, editors: Pediatric dermatology, ed 3. Philadelphia, 1988, Mosby,*

ure 253-3 Herpes zoster involving the lumbar dermatome. *(From ndell GL, Bennett JE, Dolin R, editors:* Principles and practice of ectious diseases, *ed 6. Philadelphia, 2005, Elsevier, p. 1783.)*

How Do Kids Get Cold Sores?

Kids can get HSV-1 by kissing or touching a person with cold sores, or by sharing eating utensils, towels, or other items with an infected person. Many kids get infected with HSV-1 during the preschool years.

Cold Sores Treatment

Cold sores usually go away in about 1 to 2 weeks. No medicines can make the virus go away, but some treatments can help make cold sores less painful and not last as long:

- Cold compresses can help with discomfort.
- Prescription or over-the-counter treatments are sometimes recommended by the doctor.
- Cool foods and drinks can help make kids more comfortable.
- Giving acetaminophen may ease pain.

For parents: call the doctor if your child:

- is younger than 6 months old and gets a cold sore
- has a weakened immune system, which could allow the HSV infection to spread and cause problems in other parts of the body
- has sores that don't heal by themselves within 2 weeks

- has any sores near the eyes or irritation of the eyes
- gets cold sores a lot

Cold Sores' Prevention

The virus that causes cold sores is very contagious. To help prevent it from spreading to others, anyone with a cold sore should:

Keep their drinking glasses and eating utensils, as well as washcloths and towels, separate from those used by other family members and wash these items well after use.

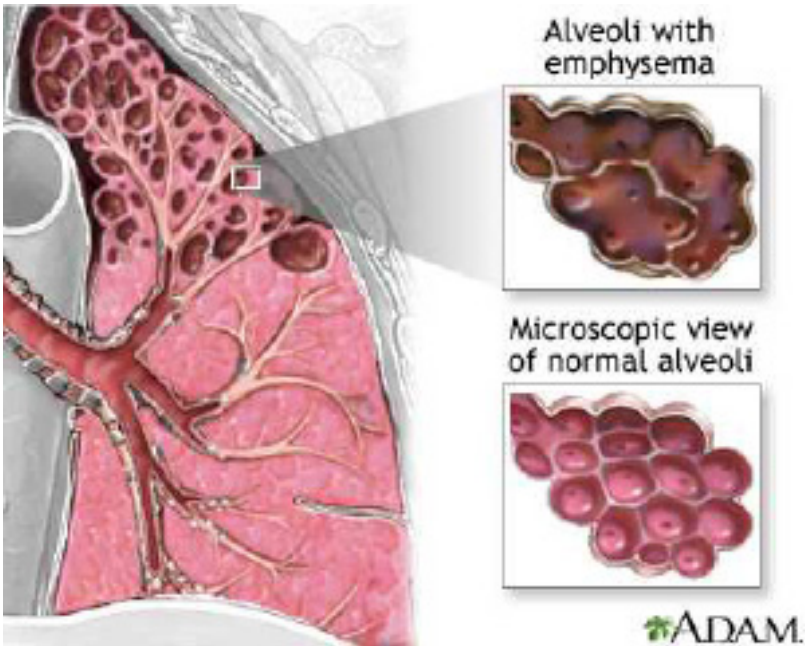
Not kiss others until the sores heal.

Wash their hands well and often, especially after touching a cold sore.

They also should try not to touch their eyes. If HSV infects the eyes, it can be very serious.

If you're caring for a child with a cold sore, wash your hands often so that you don't get the virus or spread it to others.

Croup



Croup is an infection of the upper airways that causes breathing difficulty and a "barking" cough, due to swelling around the vocal cords. It is common in.

Infants and childrenwith croup **have a virus** that makes their airways swell. They have a telltale **"barking" cough** (often compared to the sound of a seal's bark) and a raspy voice, and make a high-pitched, squeaky noise when they breathe.

Most kids with croup get better in a week or so.

Symptoms of Croup

At first, a child may have cold symptoms, like a stuffy or runny nose and a fever. As the upper airways — the voice box (larynx) and windpipe (trachea)— become irritated and swollen, a child may become hoarse and have the barking cough.

If the airways continue to swell, breathing gets harder. Kids often make a high-pitched or squeaking noise while breathing in — this is called **stridor**. They also might breathe very fast or have **retractions** (when the skin between the ribs pulls in during breathing). In the most serious cases, a child may appear pale or have a bluish color around the mouth due to a lack of oxygen.

Symptoms of croup are often worse at night and when a child is upset or crying.

Causes of Croup

The same viruses that cause the common cold also cause croup. such as parainfluenza RSV, measles, adenovirus, and influenza. More severe cases of croup may be caused by bacteria. This condition is called bacterial tracheitis Most often seen in the fall, croup can affect kids up to age 5.

Croup-like symptoms may also be caused by:

- Allergies
- Breathing in something that irritates airway
- Acid reflux

There are two types of croup, **viral croup** and **spasmodic croup**, both of which cause the barking cough. Most cases of croup are viral.

Croup' Diagnose

Health care providers listen for the telltale cough and stridor will examine child's chest to check for:

- Difficulty breathing in and out
- Whistling sound (wheezing)
- Decreased breath sounds
- Chest retractions with breathing

Doctor will also ask if a child has had any recent illnesses that caused a fever, runny nose, and congestion; and if the child has a history of croup or upper airway problems.

The doctor might order a neck X-ray if the croup is severe and slow to get better after treatment. In cases of croup, an X-ray usually will show the top of the airway narrowing to a point, which doctors call a "steeple sign."

Croup' Treatment

Most cases of croup are mild and can be treated at home. Try to keep your child calm, as crying can make croup worse.

For a fever, medicine (acetaminophen or, only for kids older than 6 months, ibuprofen) may make your child more comfortable. Ask your health care provider how much to give and follow the directions carefully.

Dexamethazone 0,6 mg/kg IM oral

Breathing in moist air can help kids feel better. To help your child breathe in moist air:

Use a **cool-mist humidifier** or run a hot shower to create a **steam-filled bathroom** where you can sit with your child for 10 minutes. Breathing in the mist will sometimes stop the severe coughing.

In cooler weather, taking your child outside for a few minutes to breathe in the cool air may ease symptoms. You also can try taking your child for a drive with the car windows slightly lowered.

Your child should drink plenty of fluids to prevent dehydration. If needed, give small amounts of liquid more often using a spoon or medicine dropper. Kids with croup also should get lots of rest.

Some kids need a breathing treatment that can be given in the hospital or a **steroid medicine to reduce swelling in the airway**. Rarely, kids with croup might need to stay in a hospital until they're breathing better. Commonly used steroid, in this case is **Dexamethazone 0,6 mg/kg IM oral.**

To summaries Croup treatment's key steps include:

- Expose your child to cool or moist air, such as in a steamy bathroom or outside in the cool night air. This may offer some breathing relief.
- Set up a cool air vaporizer in the child's bedroom and use it for a few nights.
- Make your child more comfortable by giving acetaminophen. This medicine also lowers a fever so the child will not have to breathe as hard.
- Avoid cough medicines unless you discuss them with your provider first.

Doctor, in needed, prescribe medicines, such as:

- Steroid medicines taken by mouth or through an inhaler
- Antibiotic medicine (for some, but not most cases)

Your child may need to be treated in the emergency room or to stay in the hospital if they:

- Have breathing problems that do not go away or get worse
- Become too tired because of breathing problems
- Have bluish skin color
- Are not drinking enough fluids

Medicines and treatments used at the hospital include:

- Breathing medicines given with a nebulizer machine
- Steroid medicines given through a vein (IV)
- An oxygen tent placed over a crib
- Fluids given through a vein for dehydration
- Antibiotics given through a vein

Rarely, a breathing tube through the nose or mouth will be needed to help child breathe.

Outlook (Prognosis)

Croup is most often mild, but it can still be dangerous. It most often goes away in 3 to 7 days.The tissue that covers the trachea (windpipe) is called the epiglottis. If the epiglottis becomes infected, the entire windpipe can swell shut. This is a life-threatening condition.

If an airway blockage is not treated promptly, the child can have severe trouble breathing or breathing may stop completely.

For parents

Most kids recover from croup with no lasting problems. But some kids — especially those who were born prematurely, or have asthma or other lung diseases — can be at risk for complications from croup.

Call your doctor or get immediate medical care if your child:

- has trouble breathing, including very fast or labored breathing
- is too out of breath to talk or walk
- has pulling in of the neck and chest muscles when breathing
- has stridor that is getting worse
- is pale or bluish around the mouth
- is drooling or has trouble swallowing
- is very tired or sleepy or hard to awaken
- is dehydrated (signs include a dry or sticky mouth, few or no tears when crying, sunken eyes, thirst, peeing less)

Influenza Antiviral Medications

Antiviral treatment is recommended as early as possible for any patient with confirmed or suspected influenza who:

is hospitalized;

- has severe, complicated, or progressive illness; or
- is at higher risk for influenza complications.

Decisions about starting antiviral treatment should not wait for laboratory confirmation of influenza.

For outpatients with acute uncomplicated influenza, oral oseltamivir, inhaled zanamivir, intravenous peramivir, or oral baloxavir may be used for treatment.

For patients with severe or complicated illness with suspected or confirmed influenza (e.g., pneumonia, or exacerbation of underlying chronic medical condition) who are not hospitalized, antiviral treatment with oral or enterically-administered oseltamivir is recommended as soon as possible.

ble 1. Antiviral Medications Recommended for Treatment and Chemoprophylaxis of Influenza

Antiviral Agent	Activity Against	Use	Recommended For	Not Recommended for Use in	Adverse Events
Oral Oseltamivir	**Influenza A and B**	**Treatment**	Any age[1]	N/A	**Adverse events:** nausea, vomiting, headache. Post marketing reports of serious skin reactions and sporadic, transient neuropsychiatric events[2]
		Chemo-prophylaxis	3 months and older[1]	N/A	
Inhaled Zanamivir	**Influenza A and B**	**Treatment**	7 yrs and older[3]	people with underlying respiratory disease (e.g., asthma, COPD)[3]	**Adverse events:** risk of bronchospasm, especially in the setting of underlying airways disease; sinusitis, and dizziness.. Post marketing reports of serious skin reactions and sporadic, transient neuropsychiatric events[2]
		Chemo-prophylaxis	5 yrs and older[3]	people with underlying respiratory disease (e.g., asthma, COPD)[3]	
Intravenous	**Influenza A**	**Treatment**	2 yrs and older[4]	N/A	**Adverse**

Peramivir	**and B[4]**	**Chemo-prophylaxis[5]**	Not recommended	N/A	**events:** diarrhea. Post marketing reports of serious skin reactions and sporadic, transient neuropsychiatric events[2]
Oral Baloxavir	**Influenza A and B[6]**	**Treatment**	12 yrs and older[6]	N/A	**Adverse events:** none more common than placebo in clinical trials
		Chemo-prophylaxis[5]	Not recommended	N/A	

Abbreviations: N/A = not applicable, COPD = chronic obstructive pulmonary disease.

Table 245-2 Antiviral Therapies for Non-HIV Clinical Conditions

VIRUS	CLINICAL SYNDROME	ANTIVIRAL AGENT OF CHOICE	ALTERNATIVE ANTIVIRAL AGENTS
Influenza A	Treatment	Oseltamivir (>1 yr old)	Rimantadine Amantadine
	Prophylaxis	Oseltamivir (>1 yr old)	Amantadine Rimantadine Zanamivir (>7 yr old)
Influenza B	Treatment	Oseltamivir	Zanamivir (>7 yr old)
Respiratory syncytial virus	Bronchiolitis or pneumonia in high-risk host	Ribavirin aerosol	
Cytomegalovirus (CMV)	Congenital CMV infection	Ganciclovir (IV)	Valganciclovir (if oral therapy appropriate; long-term oral valganciclovir investigational but may improve developmental and hearing outcomes)
	Retinitis in AIDS patients	Valganciclovir	Ganciclovir Cidofovir Foscarnet Ganciclovir ocular insert
	Pneumonitis, colitis; esophagitis in immunocompromised patients	Ganciclovir (IV)	Foscarnet Cidofovir Valganciclovir

ANTIVIRAL	TRADE NAME	MECHANISM OF ACTION
Acyclovir	Zovirax	Inhibits viral DNA polymerase
Adefovir	Hepsera	Nucleotide reverse transcriptase inhibitor
Amantadine	Symmetrel	Blocks M2 protein ion channel
Cidofovir	Vistide	Inhibits viral DNA polymerase
Famciclovir	Famvir	Inhibits viral DNA polymerase
Fomivirsen	Vitravene	Phosphorothioate oligonucleotide inhibits viral replication via antisense mechanism
Foscarnet	Foscavir	Inhibits viral DNA polymerase and reverse transcriptase at pyrophosphate-binding site
Ganciclovir	Cytovene	Inhibits viral DNA polymerase
Idoxuridine	Herplex	Inhibits viral DNA polymerase
Interferon-α	Intro-A (interferon-α2b) Roferon-A (interferon-α2a) Infergen (interferon alfacon-1)	Produces multiple effector proteins that exert antiviral effects; also directly interacts with immune system components
Interferon-α2b plus ribavirin	Rebetron	Not established
Lamivudine	Epivir	Inhibits viral DNA polymerase and reverse transcriptase
Oseltamivir	Tamiflu	Neuraminidase inhibitor; interference with deaggregation and release of viral progeny
Pegylated interferon	PEG-Intron (α2b), Pegasys (α2a)	Same as interferon
Penciclovir	Denavir	Inhibits viral DNA polymerase
Ribavirin	Virazole, Rebetol, Copegus	Interference with viral messenger RNA
Rimantadine	Flumadine	Blocks M2 protein ion channel
Trifluridine	Viroptic	Inhibits viral DNA polymerase
Valacyclovir	Valtrex	Same as acyclovir
Valganciclovir	Valcyte	Same as ganciclovir
Vidarabine	ara-A	Inhibits viral DNA polymerase (and to lesser extent, cellular DNA polymerase)
Zanamivir	Relenza	Neuraminidase inhibitor; interference with deaggregation and release of viral progeny

FDA-APPROVED COMBINATION THERAPIES	
Interferon-α2b + ribavirin	Rebetron (Intron-A plus Rebetol)
Interferon-α2a + ribavirin	Roferon-A + ribavirin
Pegylated interferon-α2b + ribavirin	PEG-Intron + Rebetol
Pegylated interferon-α2a + ribavirin	Pegasys + Copegus

*See Chapter 276 for antiretroviral drugs.

Recommendations for Prevention and Control of Influenza in Children, 2019-2020.

COMMITTEE ON INFECTIOUS DISEASES.

Collaborators (15)

Abstract

This statement updates the recommendations of the American Academy of Pediatrics for the routine use of influenza vaccines and antiviral medications in the prevention and treatment of influenza in children during the 2019-2020 season. The American Academy of Pediatrics continues to recommend routine influenza immunization of all children without medical contraindications, starting at 6 months of age. Any licensed, recommended, age-appropriate vaccine available can be administered, without preference of one product or formulation over another. Antiviral treatment of influenza

with any licensed, recommended, age-appropriate influenza antiviral medication continues to be recommended for children with suspected or confirmed influenza, particularly those who are hospitalized, have severe or progressive disease, or have underlying conditions that increase their risk of complications of influenza.

How to Safely Give Acetaminophen

Acetaminophen is an over-the-counter medicine taken to relieve fever and pain. It's a safe drug when used correctly for a wide variety of problems. But too high a dose can make a child very sick. Giving too much can lead to liver damage and, in rare cases, even death. So it's important to know how to properly give acetaminophen.

If you have any questions about giving acetaminophen to your child, ask your doctor or pharmacist. Never give this or any other kind of medicine to a child younger than 2 years old without getting a doctor's OK first.

What Is Acetaminophen Also Called?

Acetaminophen is the generic name of this drug. In some other countries, acetaminophen is known as paracetamol. Many generic brands of acetaminophen are available.

The most common brand name for this medicine is Tylenol®, but it is also sold under the names Panadol®, FeverAll®, and Tempra®.

What Types of Acetaminophen Are Available?

For kids, this medicine is available in oral suspensions (liquid form) and also chewable tablets. Chewable tablets are best for children 6 years of age and older. Rectal suppositories (FeverAll® or Tempra®) are available for children who have trouble taking medicine by mouth or can't keep medicines down due to vomiting.

Tylenol® makes Infants' Tylenol® ("drops") and Children's Tylenol® oral suspensions, as well as Jr. Tylenol® chewable tablets. Many generic brands of acetaminophen are available in similar forms.

Tylenol® and other brands that make infant drops used to offer them in a more concentrated formula, which was 80 mg/0.8 ml per dose. These drops were taken off the market because babies were getting sick after parents mistakenly gave too much medicine while using kitchen teaspoons or measuring cups from Children's Tylenol®. **If you have Infants' Tylenol® or a similar product in the 80 mg strength, throw it**

away and do not give it to your child. The new infant drops have the same concentration as Children's Tylenol® (160 mg/5 ml per dose).

Giving Acetaminophen

Refer to the following dosage charts for the correct dosage of acetaminophen.

Other things to know:

Check the expiration date to make sure it's not expired. If it is, throw the medicine away and buy a new product. For proper disposal, remove the medicine from its original container and place it in an undesirable substance that children or animals wouldn't be tempted to eat, like coffee grounds or kitty litter. Then, put it in a sealable bag inside a garbage can.

Make sure your child isn't already taking medicines with acetaminophen in them. Acetaminophen is a very common ingredient in cough, cold, and allergy medicines. If your child is taking one, talk to your doctor or pharmacist before giving your child more acetaminophen. Too much acetaminophen can damage a child's liver.

Check the concentration and recommended dosage. Give child a dose from the dropper, syringe, or cup that came with the product. This will help ensure that your child gets the right amount of milliliters, or ml (also called cc, or cubic centimeters), and doesn't overdose. Never use a measuring spoon from the kitchen or a cup or dropper from a different product. **Chewables** are not recommended for children younger than 2 years old due to the risk of choking.

When giving for a fever, consider the child's temperature and age. If you have an infant 3 months or younger with a rectal temperature of 100.4°F (38°C) or higher, call your doctor or go to the emergency department immediately. If your child is between 3 months and 3 years old and has a fever of 102.2°F (39°C) or higher, call doctor to find out if he or she needs to see child.

If your child spits up or vomits up a dose of acetaminophen within the first 20 minutes, it's usually safe to give your child another dose (check with a doctor if you're unsure). If child holds the first dose down for longer than 20 minutes before spitting up, you should wait 4 hours or more before giving your child another dose.

Give acetaminophen every 4 to 6 hours as needed, but never give your child more than five doses in 24 hours.

- If your child doesn't like the flavor, you can try a product with a different flavoring.
- If your child is sensitive to dyes, use a dye-free type of acetaminophen.

Acetaminophen Dosages By Weight

Doctors recommend using a child's weight instead of age when figuring out how much medicine to give. Before giving your child a dose, check the label to make sure the recommended dosage and concentration agree with the numbers below.

This table is based on doctors' and the manufacturers' recommendations. It is not intended to replace the advice of a doctor. If your child is 2 years old or younger, get the OK from your health care professional before giving the medicine. And always call if you have any questions or concerns about giving medicine.

Weight	Acetaminophen Liquid (160 mg/5 ml)
6-11 lbs. (0-3 months)	**doctor**
12-17 lbs. (4-11 months)	**Ask your doctor**
18-23 lbs. (12-23 months)	**Ask your doctor**
24-35 lbs. (2-3 years)	1 teaspoon (5 ml, or full 5-ml dosing syringe)
36-47 lbs. (4-5 years)	1½ teaspoons (7.5 ml)
48-59 lbs. (6-8 years)	2 teaspoons (10 ml)
60-71 lbs. (9-10 years)	2½ teaspoons (12.5 ml)
72-95 lbs. (11 years)	3 teaspoons (15 ml)

Weight	Acetaminophen Jr. Strength Chewables (160 mg)
24-35 lbs. (2-3 years)	1 tablet
36-47 lbs. (4-5 years)	1½ tablets
48-59 lbs. (6-8 years)	2 tablets
60-71 lbs.	2½ tablets

Weight	Acetaminophen Jr. Strength Chewables (160 mg)
(9-10 years)	
72-95 lbs. (11 years)	3 tablets

Coxsackievirus Infections

Coxsackieviruses are part of the enterovirus family of viruses (which also includes polioviruses and hepatitis A virus) that live in the human digestive tract.

The viruses can spread from person to person, usually on unwashed hands and surfaces contaminated by feces, where they can live for several days.

In most cases, coxsackievirus infections cause mild flu-like symptoms and go away without treatment. But in some cases, they can lead to more serious infections.

Symptoms of Coxsackievirus Infections

Coxsackievirus can produce a wide variety of symptoms. About half of all kids with an infection have no symptoms. Others suddenly get a high fever, headache, and muscle aches, and some also develop a sore throat, abdominal discomfort, or nausea. A child with a coxsackievirus infection may simply feel hot but have no other symptoms. In most kids, the fever lasts about 3 days, then disappears.

Coxsackieviruses can cause symptoms that affect different body parts, including:

Hand, foot, and mouth disease, a type of coxsackievirus syndrome, causes painful red blisters in the throat and on the tongue, gums, hard palate, inside of the cheeks, and the palms of hands and soles of the feet.

Herpangina, an infection of the throat, causes red-ringed blisters and ulcers on the tonsils and soft palate, the fleshy back portion of the roof of the mouth.

Hemorrhagic conjunctivitis, an infection that affects the whites of the eyes, usually begins as eye pain, followed quickly by red, watery eyes with swelling, light sensitivity, and blurred vision.

Occasionally, coxsackieviruses can cause more serious infections that may need to be treated in a hospital, including:

- viral meningitis, an infection of the meninges (membranes that surround the brain and spinal cord)
- encephalitis, a brain infection
- myocarditis, an infection of the heart muscle

Mothers can pass an infection to their newborns during or just after birth. Babies are more at risk for a serious infection, including myocarditis, hepatitis, and meningoencephalitis (an inflammation of the brain and meninges). In newborns, symptoms can develop within 2 weeks after birth.

Are Coxsackievirus Infections Contagious?

Coxsackieviruses are very contagious. They can be passed from person to person on unwashed hands and surfaces contaminated by feces. They also can be spread through droplets of fluid sprayed into the air when someone sneezes or coughs.

When an outbreak affects a community, risk for coxsackievirus infection is highest among infants and kids younger than 5. The virus spreads easily in group settings like schools, childcare centers, and summer camps. People are most contagious the first week they're sick.

In cooler climates, outbreaks most often happen in the summer and fall, but tropical parts of the world have them year-round in.

Coxsackievirus Infections Treatment

Depending on the type of infection and symptoms, the doctor may prescribe medicines to make your child feel more comfortable.

Take over-the-counter medications to relieve fever and pain caused by mouth sores. Drink enough liquids. Mouth sores can make it painful to swallow, so your child might not want to drink much. Make sure they drink enough to stay hydrated.

Most kids with a simple coxsackievirus infection recover completely after a few days without needing any medical treatment. A child who has a fever without any other symptoms should rest in bed or play quietly indoors. Offer plenty of fluids to prevent dehydration.

There is no specific treatment of HFMD. Patients should drink lots of water and may require treatment according to their symptoms to reduce fever and pain from ulcers.

How long the infection lasts can vary. Kids who only have a fever may see their temperature return to normal within 24 hours, although the average fever lasts 3 days. Hand, foot, and mouth disease usually lasts for 2 or 3 days; viral meningitis can take 3 to 7 days to clear up.

For parents education

Call the doctor immediately if your child has any of these symptoms:

- fever higher than 100.4°F (38°C) for infants younger than 6 months and higher than 102°F (38.8°C) for older kids
- poor appetite
- trouble feeding
- vomiting
- diarrhea
- difficulty breathing
- convulsions
- unusual sleepiness
- pain in the chest or abdomen
- sores on the skin or inside the mouth
- severe sore throat
- severe headache, especially with vomiting, confusion, or unusual sleepiness
- neck stiffness
- red, swollen, and watery eyes
- pain in one or both testicles

Coxsackievirus Infections Prevention

There is no vaccine to prevent coxsackievirus infection. Hand washing is the best protection. Remind everyone in your family to wash their hands well and often, especially after using the toilet, after changing a diaper, before meals, and before preparing food. Shared toys in childcare centers should be cleaned often with a disinfectant because the virus can live on these objects for days.

Kids who are sick with a coxsackievirus infection should be kept out of school or childcare for a few days to avoid spreading the infection.

Hand, Foot, and Mouth Disease

Hand, foot, and mouth disease (HFM) is a common viral infection that causes painful red blisters in the mouth and throat, and on the hands, feet, and diaper area.

HFM is contagious and easily spreads to others through contact with unwashed hands, feces, saliva, mucus from the nose, or fluid from the blisters. Kids under age 5 are most at risk for HFM, as infections are common in childcare centers, preschools, and other places where kids are in close quarters.

Besides the blisters, kids often have a fever for a few days and can get dehydrated because it hurts to swallow liquids. Symptoms usually clear up within a week and kids recover completely.

There's no cure for HFM and no vaccine to prevent it, but your doctor can recommend home care to make your child more comfortable during recovery.

Symptoms of Hand, Foot, and Mouth Disease (HFM)

The blisters caused by HFM are red with a small bubble of fluid on top. They often peel, leaving an ulcer, which is a sore with a reddish base. The soles of the feet and the palms of the hands may have a rash that can look like flat red spots or red blisters.

Figure 250-1 **A,** Oval blisters of the palms in a child with hand-foot-and-mouth disease (coxsackievirus A16 infection). **B,** Oval blisters on the feet of a child with hand-foot-and-mouth disease. **C,** Erosion of the tongue in a child with hand-foot-and-mouth disease. *(From Weston WL, Lane AT, Morelli JG:* Color textbook of pediatric dermatology, *ed 3, St. Louis, 2002, Mosby, p. 109.)*

Occasionally, a pink rash may be seen on other parts of the body, such as the buttocks and thighs. However, some kids will have no problems other than sores in the back of the throat.

It can be hard for parents to tell if a child (especially a very young one) has HFM if sores are only inside the mouth or throat. Very young kids might not be able to communicate that they have a sore throat, but if a child stops eating or drinking, or wants to eat or drink less often, it's a sign that something is wrong.

A child with HFM also might:

- have a fever, muscle aches, or other flu-like symptoms
- become irritable or sleep more than usual
- begin drooling (due to painful swallowing)
- only want to drink cold fluids

HFM's Treatment

You can give acetaminophen or ibuprofen if your child is achy or irritable.

Cold foods like ice cream, smoothies, and popsicles also help by numbing the area, and will be a welcome treat for kids who have trouble swallowing (and even those who don't!). Avoid hot drinks, sodas, and acidic food (citrus juice, tomato sauce, etc.) because they can make the pain worse.

Kids with blisters on their hands or feet should keep the areas clean and uncovered. Wash the skin with lukewarm soap and water, and pat dry. If a blister pops, dab on a bit of antibiotic ointment to help prevent infection and cover it with a small bandage.

Make sure your child drinks plenty of fluids to stay hydrated., can't be comforted, is sluggish, or seems to be getting worse. Also call if you see signs of dehydration, like a dry or sticky mouth, sunken eyes, or decreased urine output.

Hand, Foot, and Mouth Disease' (HFM) Prevention

To prevent the spread of HFM, keep kids home from school and childcare while they have a fever or open blisters on the skin and in the mouth.

Hand washing is the best protection. Remind everyone in your family to wash their hands well and often, especially after using the toilet or changing a diaper, and before preparing or eating food. Shared toys in childcare centers should be cleaned often with a disinfectant because many viruses can live on objects for a few days.

Fifth Disease

Fifth disease is viral illness that most kids recover from quickly and without complications. Also called **erythema infectiosum**, it's caused **by parvovirus B19**. It's especially common in kids ages 5 to 15.

This diseases got its name because **it was fifth in a list of historical** classifications of common skin rash illnesses in children

Fifth disease causes a distinctive red rash on the face that makes a child appear to have a""slapped cheek." A few days later, the rash spreads down to the trunk, arms, and legs. It usually lasts 1 to 3 weeks.

In older kids and adults, fifth disease can cause joint swelling and pain that can last from weeks to months and, very rarely, years.

Signs and Symptoms

Fifth disease begins with a low fever, headache, and mild cold-like symptoms (like a stuffy or runny nose). These symptoms pass, and the illness seems to be gone until the rash appears a few days later. Kids younger than 10 are most likely to get the rash.

The bright red rash usually starts on the face."slapped cheek" rash. This rash is the most recognized feature of fifth disease. It is more common in children than adults. Then, red blotches (usually lighter in color) appear on the trunk, arms, and legs. After a few days, the rash, which can be itchy, takes on a *lacy net-like look.*

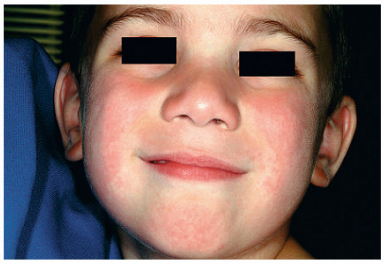


Figure 251-1 Erythema infectiosum. Erythema of the bilateral cheeks, which has been likened to a "slapped cheek" appearance. *(From Paller AS, Macini AJ: Hurwitz clinical pediatric dermatology, ed 3. Philadelphia, 2006, WB Saunders, p. 431.)*

In the time that it takes for the rash to completely clear, it may seem to get worse before it finally fades away.

Sometimes fifth disease also can cause swollen glands, red eyes, sore throat, diarrhea, and rarely, rashes that look like blisters or bruises. Joint swelling or pain (often in the hands, wrists, knees, or ankles) can sometimes happen, especially in adults and older teens.

Fifth Disease's Contagious& Transmission

Because the rash is due to an immune system reaction that happens **after** the infection has passed, someone with fifth disease is most contagious **before** the rash appears. Kids usually don't spread the infection once they have the rash.

Parvovirus B19—which causes fifth disease—spreads through respiratory secretions, such as saliva, sputum, or nasal mucus, when an infected person coughs or sneezes. You are most contagious when it seems like you have "just a fever and/or cold" and before you get the rash or joint pain and swelling. After you get the rash you are not likely to be contagious, so it is usually safe for you or your child to go back to work or school.

People with fifth disease who have weakened immune systems may be contagious for a longer amount of time.

Parvovirus B19 can also spread through blood or blood products. A pregnant woman who is infected with parvovirus B19 can pass the virus to her baby.

Once you recover from fifth disease, you develop immunity that generally protects you from parvovirus B19 infection in the future.

Fifth Disease Prevention

There is no vaccine to prevent fifth disease, and no real way to prevent spreading the virus because a person usually isn't contagious by the time the rash appears.

Fifth Disease' Diagnose

Healthcare providers can often diagnose fifth disease just by seeing "slapped cheek" rash on a patient's face. They can also do a blood test to determine if you are susceptible or possibly immune to parvovirus B19 infection or if you were recently infected. This is not a routine test but can be performed in special circumstances. The blood test may be particularly helpful for pregnant women who may have been exposed to parvovirus B19 and are suspected to have fifth disease. Any pregnant woman who may have been exposed to parvovirus B19 should contact their obstetrician or healthcare provider as soon as possible

Fifth Disease Treatment

Fifth disease is caused by a virus, so can't be treated with antibiotics (antibiotics kill bacteria, not viruses). In most cases, this is a mild illness that clears up on its own, so no medicine is needed.

Usually, kids with fifth disease feel OK and just need to rest. After the fever and mild cold symptoms are gone, there may be little to treat except any discomfort from the rash.

If your child's rash is itchy, ask the doctor for advice about easing discomfort. The doctor may also recommend acetaminophen for a fever or joint pain. **Do not give aspirin** to your child, as it has been linked to a rare but serious illness called Reye syndrome.

Complications

Fifth disease might cause some children with weakened immune systems (such as those with AIDS or cancer) or with certain blood disorders (like sickle cell disease or hemolytic anemia) to become ill. The virus that causes it (parvovirus B19) can temporarily slow down or stop the body's production of oxygen-carrying red blood cells (RBCs). This can lead to severe anemia, which needs to be treated in a hospital.

Also for some people, if you have a weakened immune system caused by leukemia, cancer, organ transplants, or HIV infection, **parvovirus B19** infection can cause serious health complications, such as chronic anemia that requires medical treatment.

You may also have painful or swollen joints

People with fifth disease can also develop pain and swelling in their joints. This is called polyarthropathy syndrome. It is more common in adults, especially women. Some adults with fifth disease may only have painful joints, usually in the hands, feet, or knees, and no other symptoms. The joint pain usually lasts 1 to 3 weeks, but it can last for months or longer. It usually goes away without any long-term problems.

Treatment

Fifth disease is usually mild and will go away on its own. Children and adults who are otherwise healthy usually recover completely. Treatment usually involves relieving symptoms, such as fever, itching, and joint pain and swelling.

People who have complications from fifth disease should see their healthcare provider for medical treatment

Prevention

There is no vaccine or medicine that can prevent parvovirus B19 infection. You can reduce your chance of being infected or infecting others by

- washing your hands often, for at least 20 seconds, with soap and water
- covering your mouth and nose when you cough or sneeze
- not touching your eyes, nose, or mouth
- avoiding close contact with people who are sick
- staying home when you are sick

Once you get the rash, you are probably not contagious. So, it is usually safe for you to go back to work or for your child to return to school or a child care center.

Healthcare providers who are pregnant should know about potential risks to baby and discuss this with doctor.

All healthcare providers and patients should follow strict infection control practices to prevent parvovirus B19 from spreading. For information about handwashing,

For parents' education

Call the doctor if your child develops a rash, especially if the rash is widespread over the body or accompanied by other symptoms, like fever, cold symptoms, or joint pain.

If you're pregnant and develop a rash or if you've been exposed to someone with fifth disease (or to anyone with an unusual rash), call your health care provider.

Smallpox

Smallpox is an infection caused by the variola virus. For centuries, epidemics affected people all over the globe, and the disease was often serious. But in 1796, British doctor Edward Jenner discovered a way to protect people from getting smallpox, which led to the development of the first smallpox vaccine.

The vaccine worked so well that the United States stopped vaccinating the general population against smallpox in 1972 because the disease was no longer a threat (the last U.S. case of smallpox was in 1949).

The world's last known case of smallpox was reported in Africa in 1977. In 1980, the World Health Organization (WHO) announced that smallpox was wiped out — the first (and only) time in history that an infectious disease was declared eliminated from the planet.

Should We Still Worry About Smallpox?

Although smallpox infection was wiped out many years ago, samples of the variola virus that causes smallpox were saved in laboratories. Some people have expressed concern that terrorists could try to get access to these stored virus samples with the aim of spreading smallpox infection.

Despite talk about the possibility of terrorists spreading smallpox as a biological weapon, the reality is that this probably wouldn't happen for a couple of reasons. First, terrorists would need access to the virus samples, and the few research laboratories that keep them have security measures to guard them. Also, it would be extremely difficult for a group to take the time to produce a large amount of the variola virus without being detected.

The smallpox vaccine also would prevent the spread of disease because it can:

prevent people from becoming infected if they're vaccinated quickly after exposure to the virus

make the illness less severe in people who do become infected if they're vaccinated within a few days

Can Vaccines Stop a Smallpox Outbreak?

After the September 11, 2001, terrorist attacks and the anthrax scare that same year, the U.S. government took the precaution of asking several companies to begin making smallpox vaccine again. Today, there's enough vaccine on hand to protect the American people in the event of a smallpox outbreak.

Public health officials have a rapid response plan ready to vaccinate anyone exposed to the disease, as well as people who come into contact with them. So although a person doesn't need to get vaccinated at the moment, the vaccine is there in case it's needed.

Because the vaccine can stop the spread of the disease, experts believe it's unlikely that terrorists will go to the trouble of producing and using smallpox as a biological weapon — it would take too long and have little effect.

Signs of a Smallpox Infection?

If someone becomes infected with smallpox, it may take anywhere from 7 to 17 days for symptoms to develop. At first a person may have flu-like symptoms such as high fever, tiredness, headaches, and backaches.

Within 2 to 3 days after symptoms start, a rash develops that typically affects the face, legs, and arms. It starts with red marks that become filled with pus and crust over. Scabs develop and then fall off after about 3 to 4 weeks.

Is Smallpox Contagious?

Smallpox is very contagious, particularly during the first week a person has the rash. It is most commonly spread in infected drops of saliva when people cough or sneeze. Someone is contagious until after all the scabs have fallen off.

How Is Smallpox Treated?

Antibiotics don't work against viruses — they're only effective against bacteria — so taking them won't help someone with smallpox. Vaccination is the only effective weapon against the spread of smallpox. Immunization successfully wiped out smallpox before and, should it become necessary, can help stop any future outbreaks. Researchers are also working to develop other treatments too.

It's very unlikely that you or your child will ever be exposed to the virus that causes smallpox. But if you're worried about it, talk to a medical professional, who can help you find the answers to your questions.

Human metapneumovirus (HMPV) can cause **upper and lower respiratory disease** in people of all ages, especially among **young children**

Discovered in 2001, and HMPV is in the paramyxovirus family along with respiratory syncytial virus (RSV). Molecular diagnostic testing has increased identification of HMPV.

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MPV can be confirmed usually bydirect detection of **viral genome** by polymerase chain reaction assays,anddirect detection of **viral antigens** in respiratory secretions using immunofluorescence or enzyme immunoassay.

RED BOOK

“Human metapneumovirus (hMPV) causes acute respiratory tract illness in people of all ages and is one of the leading causes of bronchiolitis in infants. hMPV also causes pneumonia, asthma exacerbations, croup, and upper respiratory tract infections (URIs) with concomitant acute otitis media in children. Similar to influenza, infection with hMPV has been associated with invasive secondary bacterial infections,

including *Streptococcus pneumoniae,* that can result in severe disease. hMPV is associated with acute exacerbations of chronic obstructive pulmonary disease (COPD) and pneumonia in adults. Otherwise healthy young children infected with hMPV usually have mild or moderate respiratory symptoms, but some young children have severe disease requiring hospitalization. hMPV infection in immunosuppressed people may result in severe disease, and fatalities have been reported in hematopoietic stem cell or lung transplant recipients. Preterm birth and underlying cardiopulmonary disease are risk factors for more severe disease. Children with a history of gestational age <32 weeks are at higher risk for hospitalization, suffer more severe disease, and require longer stays and more supplementary oxygen. Preterm birth is associated with more severe disease not only in infancy but also in later years of life. Recurrent infection occurs throughout life and, in previously healthy people, usually is mild or asymptomatic."

Symptoms commonly associated with HMPV include cough, fever, nasal congestion, and shortness of breath. Clinical symptoms of HMPV infection may progress to bronchitis or pneumonia and are similar to other viruses that cause upper and lower respiratory infections.

The estimated incubation period is 3 to 6 days, and the median duration of illness can vary depending upon severity but is similar to other respiratory infections caused by viruses. HMPV to be most active during late winter and spring in temperate climates. HMPV, RSV, and influenza can circulate simultaneously during the respiratory virus season

Transmission: **By** secretions from coughing and sneezing, close personal contact, such as touching or shaking hands, touching objects or surfaces that have the viruses on them **then touching the mouth, nose, or eyes**.

currently, there is **no specific antiviral therapy to treat HMPV and no vaccine to prevent HMPV,** hMPV treatment is mostly geared toward easing symptoms. Generally, this means using over-the-counter medications to control pain and fever, along with a decongestant. Patients with more severe wheezing and coughing may require a temporary inhaler, which may include an inhaled corticosteroid.

Arboviral disease

Arboviral disease is caused by a group of viruses spread to people by the bite of infected arthropods (insects) mosquitoes and ticks.These infections usually occur during warm weather months. Examples include California encephalitis, Chikungunya, dengue, Eastern equine encephalitis, Powassan, St. Louis encephalitis, West Nile, Yellow Fever, and Zika

Other diseases spread by the bite of infected arthropods that are not viral infections,

such as **Lyme disease, which is a bacterial** infection, and babesiosis, which is a parasitic infection, are not arboviruses

Anyone can get an arboviral infection but young children and the elderly appear to be most affected.Young children may experience more severe illness with Eastern equine encephalitis and certain types of California encephalitis..

People who travel to or reside in areas where certain **arboviruse**s are commonly found are at increased risk of getting an arboviral infection

For example, Chikungunya is frequently found in Africa, Asia, the Caribbean, and Latin America, whereas Powassan virus is most frequently found in the northeastern and Great Lakes regions of the United States. Arboviruses found in New York State include West Nile virus, Eastern equine encephalitis virus, Jamestown Canyon virus, La Crosse virus, South River virus, Potosi virus, Cache Valley virus, Powassan, and Deer Tick viruses.

Infected mosquitoes are the most common type of arthropods that spread diseases.

only some types of mosquitoes are able to spread disease and only a small number of those mosquitoes will actually carry a virus at any one time.

Some arboviral infections, such as Powassan encephalitis, may be spread by the bite of infected ticks.

Arboviral infections may also spread by blood transfusion, organ transplantation,

sexual contact, and from mother to child during birth depending on the specific virus involved.

Symptoms of arboviral infections can range from very mild to very severe.

- slight fever,
- headache,

- muscle or joint pain, and/or a
- skin rash,
- which resolve with no serious health problems.
- Severe infections are marked by a rapid onset, headache,
- high fever,
- confusion, tremors, seizures
- paralysis, coma, or death.

Symptoms usually appear 3 to 14 days after a bite from an infected mosquito or tick but

diagnose arboviral infections based on the patient's clinical symptoms and

laboratory diagnosis by testing blood and other body fluids, which show evidence of infection

What is the treatment for an infection due to an arbovirus?

Health care providers will usually **attempt to relieve** the symptoms of the illness,

But there are **no specific treatments available** for arboviral infection

Infection with an arbovirus may provide immunity to that specific virus and perhaps to related viruses.**insect repellents** can be effective at reducing bites from mosquitoes and ticks that can spread disease. If you decide to use a **repellent**,(causing disgust or distaste) use only what and how much you need for your situation.

Consider wearing long sleeves and tucking pants into socks and shirts into pants when outdoors, especially **at dawn or dusk**,

The time of day when mosquitoes are most active wear light-colored clothes to spot ticks easily.

- Dispose of tin cans, plastic containers, ceramic pots or similar water-holding containers.
- Remove and recycle all discarded tires on your property. Used tires are a significant mosquito-breeding site.
- Drill holes in the bottoms of recycling containers that are kept outdoors.
- Make sure roof gutters drain properly and clean clogged gutters in the spring and fall.
- Remove leaf debris from yards and gardens.
- Turn over wading pools and wheelbarrows when not in use.
- Change the water in birdbaths twice weekly.
- Clean vegetation and debris from edges of ponds
- Clean and chlorinate swimming pools, outdoor saunas, and hot tubs
- Remove leaf debris from yards and gardens.
- Turn over wading pools and wheelbarrows when not in use.
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- Clean vegetation and debris from edges of ponds
- Clean and chlorinate swimming pools, outdoor saunas, and hot tubs

Bacteria infection in pediatry

Bacteria are tiny, single-celled organisms that get nutrients from their environments -In child or some other living being.

Some bacteria are good for our bodies — they help keep the digestive system in working order and keep harmful bacteria from moving in.

Some bacteria are used to make medicines and vaccines.

Bacteria can cause trouble too, as with cavities, urinary tract infections ear infections, or strep throat.

Antibiotics are used to treat bacterial infections

Staph Infections

Staph is the shortened name for *Staphylococcus* a type of bacteria. These bacteria live harmlessly on many skin surfaces, especially around the nose, mouth, genitals, and anus. But if the skin is punctured or broken, staph bacteria can enter the wound and cause an infection.

Staphylococcus aureus cause most staph skin infections, and also can release toxins (poisons) that lead to illnesses like food poisoning or toxic shock syndrome.

Symptoms of a Staph Skin Infection

Staph skin infections show up in lots of different ways. Conditions often caused by *S. aureus* include:

Folliculitis : This is an infection of the hair follicles, the tiny pockets under the skin where hair shafts grow. In folliculitis, tiny white-headed pimples appear at the base of hair shafts, sometimes with a small red area around each pimple. This happens often where people shave or have irritated skin from rubbing against clothing.

A **furuncle**, commonly known as a **boil**: These swollen, red, painful lumps in the skin usually are due to an infected hair follicle. The lump fills with pus, growing larger and more painful until it ruptures and drains. Furuncles often begin as folliculitis and then worsen. They most often appear on the face, neck, buttocks, armpits, and inner thighs, where small hairs can get irritated. A cluster of several furuncles is called a **carbuncle** . Someone with a carbuncle may feel ill and have a fever.

Impetigo: This superficial skin infection is most common in young children, usually on the face, hands, or feet. It begins as a small blister or pimple, and then develops a honey-colored crust.

Cellulitis: This begins as a small area of redness, pain, swelling, and warmth on the skin, usually on the legs. As this area spreads, a child may feel feverish and ill.

A **stye**: Kids with one of these have a red, warm, uncomfortable bump near the edge of the eyelid.

MRSA: This type of staph bacteria is resistant to the antibiotics used treat staph infections. MRSA infections can be harder to treat, but most heal with proper care. Most MRSA infections involve the skin.

Scalded skin syndrome: This most often affects newborns and kids under age 5. It starts with a small staph skin infection, but the staph bacteria make a toxin that affects skin all over the body. The child has a fever, rash, and sometimes blisters. As blisters burst and the rash passes, the top layer of skin sheds and the skin surface becomes red and raw, like a burn. This serious illness affects the body in the same way as serious burns. It needs to be treated in a hospital. After treatment, most kids make a full recovery.

Wound infections: These cause symptoms (redness, pain, swelling, and warmth) similar to those from cellulitis. A person might have fever and feel sick in general. Pus or a cloudy fluid can drain from the wound and a yellow crust can develop.

Staph bacteria can spread:

- when someone touches a contaminated surface
- from person to person, especially in group living situations (like college dorms). Usually this happens when people with skin infections share personal things like bed linens, towels, or clothing.
- from one area of their body to another, via dirty hands or fingernails

Warm, humid environments can contribute to staph infections, so excessive sweating can increase someone's chances of developing an infection. People with skin problems like burns or eczema may be more likely to get staph skin infections.

Staph Infections' Treatment

Most small staph skin infections can be treated at home:

Soak the affected area in warm water or apply warm, moist washcloths. Use a cloth or towel only once when you soak or clean an area of infected skin. Then, wash them in soap and hot water and dry them fully in a clothes dryer.

- Apply **antibiotic ointment**, if recommended by doctor.
- Give pain relievers
- Occasionally, a stye will need a **topical antibiotic.**

Teens who get a staph infection on skin areas that are normally shaved should stop shaving until the infection clears up. If they do have to shave the area, they should use a clean disposable razor or clean the electric razor after each use.

Doctor may prescribe an oral antibiotic for a staph skin infection. Give it on schedule for as many days as directed. More serious staph infections might need to be treated in a hospital, and an abscess (or pocket of pus) that doesn't respond to home care might need to be drained.

To help prevent a staph infection from spreading to other parts of the body:

- Don't directly touch the infected skin.
- Keep the area covered whenever possible.
- Use a towel only once when you clean or dry the area. After using, wash the towel in hot water. Or use disposable towels.

How long it takes for a staph skin infection to heal depends on the type of infection and whether it's treated. A boil, for example, may take 10 to 20 days to heal without treatment, but treatment may speed up the healing process. Most styes go away on their own within several days.

Prevention of Staph Skin Infections

Washing hands well and often is key to preventing staph infections.

Encourage kids to keep their skin clean with a daily bath or shower. If a skin condition such as eczema makes regular bathing difficult, ask your doctor for advice.

Keep areas of injured skin — such as cuts, scrapes, and rashes caused by allergic reactions or poison ivy — clean and covered, and follow any directions given by your doctor.

If someone in your family has a staph infection, don't share towels, sheets, or clothing until the infection has been fully treated.

For parents education

Call your doctor if:

- Skin infections seem to be passing from one family member to another, or if two or more family members have skin infections at the same time.
- You think your child has a serious wound that might be infected.
- A stye doesn't go away in a few days.
- A minor infection gets worse — for example, your child starts feeling feverish or ill, or the area spreads and gets very red and hot.

Impetigo

Impetigo is a very common skin infection among kids, especially preschoolers and school-age kids. It can cause blisters or sores on the face, hands, legs, and diaper area.

Kids can be more likely to develop impetigo when their skin is already irritated by another problem, such as eczema, poison ivy, insect bites, and cuts or scrapes. Scratching a sore or a rash is a common cause — for example, poison ivy can get infected and turn into impetigo. It also happens more often in warm, humid environments. Making sure that kids wash their hands and faces well can help prevent it.

Symptoms of Impetigo

Impetigo may affect skin anywhere on the body, but is most common around the nose and mouth, hands, and forearms, and in young children, the diaper area.

The three types of impetigo are **non-bullous** (crusted), **bullous** (large blisters), and **ecthyma** (ulcers):

Non-bullous or crusted impetigo is most common. It begins as tiny blisters that eventually burst and leave small wet patches of red skin that may weep fluid. Gradually, a yellowish-brown or tan crust covers the area, making it look like it has been coated with honey or brown sugar.

Bullous impetigo causes larger fluid-containing blisters that look clear, then cloudy. These blisters are more likely to stay longer on the skin without bursting.

Ecthyma impetigo looks like "punched out" ulcers with yellow crust and red edges.

Is Impetigo Contagious?

Impetigo is contagious, and can spread from one person to another. It's usually caused by one of two bacteria: *Staphylococcus aureus* or *Streptococcus pyogenes* (also called group A streptococcus, which also causes strep throat). Methicillin-resistant *Staphylococcus aureus* (MRSA) is also becoming an important cause of impetigo.

Impetigo can spread to anyone who touches infected skin or items that have been touched by infected skin (such as clothing, towels, and bed linens). It can be itchy, so kids also can spread the infection when they scratch it and then touch other parts of their body.

Impetigo's Diagnose

In most cases, doctors can diagnose impetigo based on how the rash looks. Occasionally, they may need to take a sample of fluid from blisters for testing.

Impetigo's Treatment

Impetigo is typically treated with antibiotics, either as an ointment or a medicine taken by mouth:

When it just affects a small area of the skin (and especially if it's the non-bullous form), impetigo is treated with antibiotic ointment for 5 days.

If the infection has spread to other areas of the body or the ointment isn't working, the doctor may prescribe an antibiotic pill or liquid to be taken for 7–10 days.

After antibiotic treatment begins, healing should start within a few days. It's important to make sure that your child takes the medicine as prescribed. Otherwise, a deeper and more serious skin infection could develop.

While the infection is healing, gently wash the skin with clean gauze and antiseptic soap every day. Soak any areas of crusted skin with warm soapy water to help remove the layers of crust (you don't have to remove all of it).

To keep impetigo from spreading to other parts of the body, the doctor or nurse will probably recommend covering infected areas with gauze and tape or a loose plastic

bandage. Keep child's fingernails short and clean to prevent scratching that could lead to a worse infection.

Impetigo's Prevention

Keeping skin clean can help prevent impetigo. Kids should wash their hands well and often and take baths or showers regularly. Pay special attention to skin injuries (cuts, scrapes, bug bites, etc.), areas of eczema, and rashes such as poison ivy. Keep these areas clean and covered.

Anyone in your family with impetigo should keep their fingernails cut short and the impetigo sores covered with gauze and tape.

To prevent impetigo from spreading among family members, make sure everyone uses their own clothing, sheets, razors, soaps, and towels. Separate the bed linens, towels, and clothing of anyone with impetigo, and wash them in hot water. Keep the surfaces of your kitchen and household clean.

For parents' education

Call the doctor if any of your kids have signs of impetigo, especially if they've been around a family member or classmate with the infection.

If your child is already being treated for impetigo, keep an eye on the sores and call the doctor if the skin doesn't begin to heal after 3 days of treatment or if a fever develops. If the area around the rash becomes red, warm, or tender to the touch, call the doctor right away.

Cellulitis

Cellulitis is a skin infection that involves areas of tissue below the surface of the skin.Cellulitis can affect any area of the body, but it's most common on exposed body parts, such as the face, arms, or lower legs.

Causes of Cellulitis

Many different types of bacteria can cause cellulitis. The most common ones are group A *streptococcus* and *Staphylococcus aureus*.

Cellulitis usually begins in an area of broken skin, like a cut, bite, or scratch. People who have **body piercings** can get cellulitis because the piercing hole is a way for bacteria to get beneath the skin's surface.

But cellulitis can also start in areas where the skin isn't broken, especially in people who have chronic conditions or who take medicines that affect the immune system.

Cellulitis is not contagious. It can't spread from person to person.

Symptoms of Cellulitis

Cellulitis begins with a small area of skin that's:

- tender
- swollen
- warm
- red

As this area begins to spread, a child may begin to feel ill and get a fever and, sometimes, chills and sweats. Swollen lymph nodes (or swollen glands) are sometimes found near the area of infected skin.

The time it takes for symptoms to start varies, depending on which bacteria cause the cellulitis. For example, a child with cellulitis caused by *Pasteurella multocida*, often found in animal bites, can have symptoms less than 24 hours after the bite. But cellulitis caused by other types of bacteria may not cause symptoms for several days.

Cellulitis's Diagnose

A doctor can usually diagnose cellulitis by examining the area of affected skin. Sometimes the doctor may check for bacteria by taking blood samples. Positive blood cultures mean that bacteria from the skin infection have spread into the bloodstream. This can cause septicemia (blood poisoning), a serious infection.

Cellulitis' Treatment

For a mild case of cellulitis, doctors pr**escribe antibiotics**. These can usually cure cellulitis in 7 to 10 days. Even if your child feels better sooner than that, it's important to take all the antibiotics prescribed. Otherwise, the infection can return.

People with severe cases of cellulitis might need treatment in a hospital with **intravenous (IV) antibiotics**.

Cellulitis' Prevention

To prevent cellulitis, protect skin from cuts, bruises, and scrapes. This isn't easy, especially in active kids or those who play sports.

Kids and teens should:

- Use elbow and knee pads while skating.
- Wear a bike helmet when riding.
- Wear shin guards during soccer.
- Wear long pants and long-sleeved shirts while hiking in the woods (this can also protect them from bug bites and stings).
- Wear sandals on the beach.

When kids do get a cut or scrape, wash it well with soap and water. Apply an antibiotic ointment and cover the wound with an adhesive bandage or gauze. Check wounds often for the first few days to see if any signs of cellulitis begin.

For parents education

Call your doctor if:

- Any area of your child's skin becomes red, warm, and painful — with or without fever and chills. This is even more important if the area is on the hands, feet, or face, or if your child has an illness or condition that suppresses the immune system.
- Your child gets a large cut or a deep puncture wound.
- An animal bites your child, especially if the puncture wound is deep. Cellulitis can happen quickly after an animal bite. Human bites can cause skin infections too, so call the doctor if this happens.

For Parents

Make sure your child takes the antibiotics exactly as directed and for the full course.

Follow the doctor's suggestions for treating the area of cellulitis, such as elevating the affected part of the body or applying heat or warm soaks to it.

You can give over-the-counter pain relievers and keep a fever down. Follow the package directions about how much to give and how often to give it.

After your child takes antibiotics for 1 or 2 days, the doctor may schedule an office visit to check that the area of cellulitis has improved. This means that the antibiotics are working against the infection.

Styes

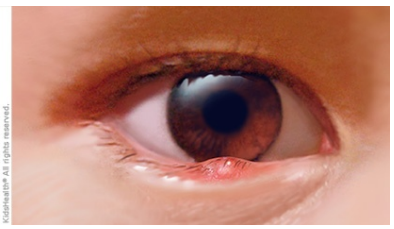
As health problems go, a stye is usually just a minor annoyance. If your child develops one, you can probably treat it at home.

A stye is a red, painful bump on the eyelid, caused by a backed-up oil gland. Styes can appear on either the upper or lower eyelid, as well as the inside or the outside of the eyelid, near the edge of the eyelid where the eyelashes are.

Eyelids have lots of oil glands. They make a special oil that mixes with tears to keep eyes lubricated.

Sometimes, these glands can get clogged with old oil, dead skin cells, and old skin bacteria. When this happens, liquid builds up in the clogged gland and can't get out.

The result is a little bump on the upper or lower eyelid that can look like a pimple. A stye can become infected and get very red and swollen.



Styes’ Treatment

If your child has a stye, you'll want to get the clogged-up oil out of it. Applying heat helps the oil become more liquid. To do this, soak a clean washcloth in warm (not hot!) water. Wring out the excess water, then place the washcloth over the eye for a few minutes. Repeat this several times a day.

You also can clean the eyelid with special eye-scrub soap (available at drugstores) or with watered-down baby shampoo, which is designed to not hurt eyes. Soak a cotton swab in the solution and use it to clean your child's eyelid.

If child wears contact lenses, have him or her switch to wearing glasses until the stye goes away. Clean the contacts well before your child wears them again.

If r child has pain in the eyeball or problems seeing, call your doctor. Also call if there is any swelling and redness beyond the eyelid (in the eye or other parts of the face).

The stye should begin to improve over a few days. If it doesn't or it gets worse, call your doctor.

The doctor may give you an antibiotic cream to use on the stye or prescribe antibiotics. In rare cases, the doctor might make a tiny cut in the eyelid to let out the clogged-up material. The doctor also will see whether your child has something other than a stye and, if so, treat it.

Styes’ Prevention

- Kids who get one stye are at higher risk for another one. To make that less likely, they should:

- Clean the eyelids every day or every couple of days with the diluted baby shampoo or special eye-scrub soap.
- Disinfect contact lenses according to the instructions.
- Remove all eye makeup completely before going to bed.
- Throw away mascara, liquid eyeliner, and eye shadow 3 months after first using them.
- Never share towels or washcloths with anyone who has a stye.

MRSA

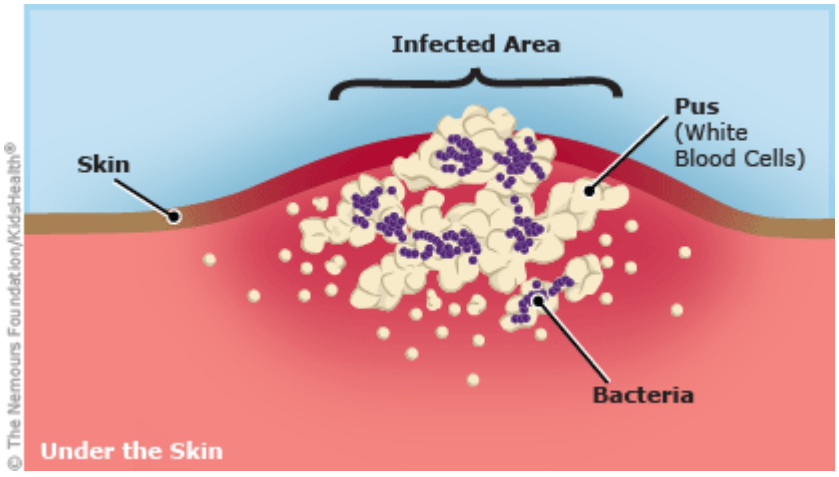
MRSA is a type of staph bacteria. MRSA stands for methicillin-resistant *Staphylococcus aureus*. It causes infections that can be hard to treat.

Many people have staph bacteria living harmlessly on their skin or in their noses. Staph bacteria that enter the body through a cut, scrape, or rash can cause minor skin infections. Most of these heal on their own if the wound is kept clean and bandaged, but sometimes antibiotics are needed.

MRSA differs from other staph bacteria because it doesn't respond well to most of the antibiotics used to treat staph infections. Bacteria that are hard to kill are called "resistant." They become resistant by changing in some way that prevents the antibiotic from doing its job. Methicillin is an antibiotic normally used to treat staph, so these bacteria are called "methicillin-resistant."

Symptoms of MRSA

MRSA infections look like other skin infections. They often develop around open sores, but also happen on intact skin. There can be red, swollen, painful areas or bumps on the affected skin. They sometimes ooze fluid or pus (an infected area with pus is an abscess). Some kids also have a fever.



In more serious cases, the infection can spread to the blood, lungs, bones, joints, or other parts of the body.

Is MRSA Contagious?

MRSA is contagious. Like all other staph bacteria, it can spread:

- when someone touches a contaminated surface
- from person to person, especially in places where large groups of people are close together (like schools, camps, or college dorms). Often this happens when people with skin infections share personal things like razors, bed linens, towels, or clothing.
- from one area of their body to another, by dirty hands or fingernails

In the past, MRSA mostly affected people in nursing homes or hospitals. It was more likely to be seen in people with weak immune systems. It was also more common in people who had a surgical wound. But now some otherwise healthy people outside of those settings are getting the infection.

Sometimes, people can be "carriers" of MRSA. This means that the bacteria stay on or in their bodies for days, weeks, or even years without causing symptoms. But they can spread it to others. That's why washing hands well and often is so important.

A doctor will examine the affected skin, and sometimes will take a sample of pus or blood. This goes to a lab for testing to find out which bacteria are causing the infection.

MRSA Treatment

Treatment depends on what the infection looks like:

- If there is an abscess, the doctor might make a small cut in the skin over it to let the pus drain out.
- The doctor may prescribe an antibiotic, either to put on the skin or to be taken by mouth (some antibiotics still work for MRSA).
- Someone with a more severe infection might get intravenous (IV) antibiotics in a hospital.

MRSA Be Prevention

These simple steps can help prevent MRSA infections:

- Adults and kids should wash their hands well and often with soap and warm water for at least 20 seconds. Alcohol-based hand sanitizers or wipes are OK if soap and water aren't handy.
- Do not touch or pick at infected areas. Cuts or broken skin should be cleaned and covered with a bandage.
- Don't share razors, towels, uniforms, or other items that come into contact with bare skin.

If sports equipment must be shared, cover it with a barrier (clothing or a towel) to prevent skin from touching it. The equipment also should be cleaned before each use with a disinfectant that works against MRSA.

For Parents

Call the doctor if:

Your child has a skin area that is red, painful, swollen, and/or filled with pus, especially if he or she has fever or feels sick.

Skin infections seem to be passing from one family member to another (or among students at school), or if two or more family members have skin infections at the same time.

Bacteria become resistant to antibiotics when they are not used properly. This includes:

- taking antibiotics for things they can't cure, like illnesses caused by viruses
- not taking all the medicine prescribed
- taking medicine that was prescribed for someone else

Taking antibiotics exactly as prescribed can help stop bacteria from becoming resistant to them. Take these precautions:

- Never give your child someone else's prescription.
- Don't save antibiotics for "next time."
- Always give antibiotics as directed until the prescription is done (unless a doctor says it's OK to stop early).

Scalded skin syndrome:

This most often affects newborns and kids under age 5.

Staphylococcal scalded skin syndrome (SSSS) is a serious skin infection. The infection causes peeling skin over large parts of the body. It looks like the skin has been scalded or burned by hot liquid. It’s more common in the summer and fall.

What causes SSSS in a child?

It’s usually caused by an infection with a type of Staphylococcal aureas bacteria. The bacteria release toxins that cause the skin to blister and peel.

Sighs and symptoms of SSSS

Symptoms can occur a bit differently in each child. They can include:

- Fussiness (irritability)
- Tiredness
- Fever
- Redness of the skin
- Fluid-filled blisters that break easily and leave an area of moist skin that soon becomes tender and painful
- Large sheets of the top layer of skin may peel away

How is SSSS diagnosed in a child?

The healthcare provider will ask about your child’s symptoms and medical history. He or she will give your child a physical exam. Your child may also have tests, such as:

Skin biopsy. A tiny sample of skin is taken and checked under a microscope. A frozen section can be done quickly to confirm the diagnosis.

Cultures. These are simple tests to check for bacteria. Cultures may be done of the blood, urine, nose and throat, and skin. In newborns, a culture of the belly button may also be done.

How is SSSS treated in a child?

Your child's healthcare provider will figure out the best treatment plan for your child based on:

- Your child’s age, overall health, and medical history
- How severe your child’s condition is
- How well your child handles certain medicines, treatments, or therapies
- If your child’s condition is expected to get worse
- The opinion of the healthcare providers involved in your child's care
- Your opinion and preference

Your child will likely need to be treated in the hospital. He or she may be in the burn unit of the hospital. This is because the with burns**treatment is similar to treating a child**. Or your child may be treated in the intensive care unit (ICU). Treatment may include:

- Antibiotic medicine given by IV (intravenous) line into the vein
- IV fluids to prevent dehydration
- Feedings through a tube from the mouth into the stomach (nasogastric feeding), if needed
- Use of skin creams or ointments and bandages
- Pain medicines

Complications may include:

- Loss of fluid causing dehydration and shock like a burn patient
- Infection that gets worse
- Scarring
- Death

Key points about staphylococcal scalded skin syndrome in children

- Staphylococcal scalded skin syndrome is usually from a bacterial infection.
- In children, the disease usually begins with fussiness (irritability), tiredness (malaise), and a fever. This is followed by redness of the skin.
- The disease can be life-threatening and needs treatment.
- Treatment usually requires a hospital stay, often in the burn or intensive care unit of the hospital.
- Treatment includes antibiotic medicine, replacing fluids, and skin care.
- Children who get prompt treatment usually recover with no scarring or complications.

Wound infections:

These cause symptoms (redness, pain, swelling, and warmth) similar to those from cellulitis. A person might have fever and feel sick in general.

Pus or a cloudy fluid can drain from the wound and a yellow crust candevelopIt starts with a small staph skin infection, but the staph bacteria make a toxin that affects skin all over the body.

The child has a fever, rash, and sometimes blisters. As blisters burst and the rash passes, the top layer of skin sheds and the skin surface becomes red and raw, like a burn.

This serious illness affects the body in the same way as serious burns. It needs to be treated in a hospital

Treatment
Antibiotics are used to treat most wound infections. Sometimes, you also may need surgery to treat the infection.

Antibiotics: Doctor may be started on antibiotics to treat the surgical wound infection. The length of time you will need to take the antibiotics varies, but will typically be for at least 1 week. You may be started on IV antibiotics and then changed to pills later. Take all of your antibiotics, even if you feel better.

If there is drainage from your wound, it may be tested to figure out the best antibiotic. Some wounds are infected with methicillin-resistant Staphylococcus aureus (MRSA) which is resistant to commonly used antibiotics. A MRSA infection will need a specific antibiotic to treat it

Diphtheria

Diphtheria is a bacterial infection that spreads easily and occurs quickly. It mainly affects the nose and throat. Children under 5 and adults over 60 years old are particularly at risk for contracting the infection. People living in crowded or unclean conditions, those who aren't well nourished, and children and adults who don't have up-to-date immunizations are also at risk.

Diphtheria is very rare in the United States and Europe, where health officials have been immunizing children against it for decades. However, it's still common in developing countries where immunizations aren't given routinely. In 1993 and 1994, more than 50,000 cases were reported during a serious outbreak of diphtheria in countries of the former Soviet Union.

Signs and Symptoms

In its early stages, diphtheria can be mistaken for a bad sore throat. A low-grade fever and swollen neck glands are the other early symptoms.

The toxin, or poison, caused by the bacteria can lead to a thick coating (or membrane) in the nose, throat, or airway, which makes a diphtheria infection different from other more common infections that cause sore throat (such as strep throat). This coating is usually fuzzy gray or black and can cause breathing problems and difficulty in swallowing.

As the infection progresses, someone may:

- have difficulty breathing or swallowing
- complain of double vision
- have slurred speech
- even show signs of going into shock (skin that's pale and cold, rapid heartbeat, sweating, and an anxious appearance)

In cases that progress beyond a throat infection, diphtheria toxin spreads through the bloodstream and can lead to potentially life-threatening complications that affect other organs, such as the heart and kidneys. The toxin can cause damage to the heart that affects its ability to pump blood or the kidneys' ability to clear wastes. It also can cause nerve damage, eventually leading to paralysis. Up to 40% to 50% of those who don't get treated can die.

Prevention

Preventing diphtheria depends almost completely on giving the diphtheria/tetanus/pertussis vaccine to children (DTaP) and non-immunized adolescents and adults (Tdap). After a single dose of Tdap, adolescents and adults should receive a booster shot with the diphtheria/tetanus vaccine (Td) every 10 years. Most cases of diphtheria occur in people who haven't received the vaccine at all or haven't received the entire course.

The Tdap vaccine is also recommended for all pregnant women during the second half of each pregnancy, regardless of whether or not they had the vaccine before, or when it was last given.

The immunization schedule calls for:

- DTaP vaccines at 2, 4, and 6 months of age
- booster dose given at 12 to 18 months
- booster dose given again at 4 to 6 years
- Tdap vaccine given at 11-12 years
- booster shots of Td given every 10 years after that to maintain protection
- Tdap vaccine during the second half of each pregnant woman's pregnancy

Although most children tolerate it well, the vaccine sometimes causes mild side effects such as redness or tenderness at the injection site, a low-grade fever, or general fussiness or crankiness. Severe complications, such as an allergic reaction, are rare.

Contagiousness

Diphtheria is highly contagious. It's easily passed from an infected person to others through sneezing, coughing, or even laughing. It also can spread to someone who picks up tissues or drinking glasses that have been used by an infected person.

People infected with the diphtheria bacteria, even if they don't have any symptoms, can infect others for up to 4 weeks. The incubation period (the time it takes for a person to become infected after being exposed) for diphtheria is 2 to 4 days, although it can range from 1 to 6 days.

Treatment

Children and adults with diphtheria are treated in a hospital. After a doctor confirms the diagnosis through a throat culture, the infected person receives a special anti-toxin, given through injections or an IV, to neutralize the diphtheria toxin already circulating in the body, plus antibiotics to kill the remaining diphtheria bacteria.

If the infection is advanced, people with diphtheria may need a ventilator to help them breathe. In cases in which the toxins may have spread to the heart, kidneys, or central nervous system, patients may need intravenous fluids, oxygen, or heart medications.

A person with diphtheria must be isolated. Family members and other close contacts who haven't been immunized, or who are very young or elderly, must be protected from contact with the patient.

When someone is diagnosed with diphtheria, the doctor will notify the local health department and treat everyone in the household who may have been exposed to the bacteria. Treatment includes assessment of immune status, throat cultures, and booster doses of the diphtheria vaccine. They will also receive antibiotics as a precaution.

Immediate hospitalization and early intervention allow most patients to recover from diphtheria. After the antibiotics and anti-toxin have taken effect, someone with diphtheria will need bed rest for a while (4 to 6 weeks, or until full recovery). Bed rest is particularly important if someone develops myocarditis (inflammation of the heart muscle), which can be a complication of diphtheria.

Those who have recovered should still receive a full course of the diphtheria vaccine to prevent a recurrence because contracting the disease doesn't guarantee lifetime immunity.

When to Call the Doctor

Call your doctor immediately if anyone in your family has symptoms of diphtheria, if you observe symptoms in someone else, if anyone in your family is exposed to diphtheria, or if you think that you or a family member is at risk. It's important to remember, though, that most throat infections are **not** diphtheria, especially in countries that have routine immunizations against it.

If you're not sure if your kids have been vaccinated against diphtheria, make an appointment. Also make sure your own booster immunizations are current. International studies have shown that a significant percentage of adults over 40 years of age aren't adequately protected against diphtheria and tetanus.

Strep Throat

Strep throat is an infection caused by a type of bacteria (group A *streptococcus*). Strep bacteria cause almost a third of all sore throats.

Strep throat usually needs treatment with antibiotics. With the proper medical care — and plenty of rest and fluids — most kids get back to school and play within a few days.

Signs & Symptoms of Strep Throat

- sore throat
- fever
- red and swollen tonsils
- painful or swollen neck glands

Not all sore throats are strep throats. Often, kids have a sore throat because of a virus , which will usually clear up without medical treatment.

Kids who do have strep throat might get other symptoms within about 3 days, such as:

- red and white patches in the throat
- trouble swallowing
- a headache
- lower stomach pain
- general discomfort, uneasiness, or ill feeling
- loss of appetite
- nausea
- rash

Strep throat is very **contagious**. Anybody can get it, but most cases are in school-age kids and teens. Infections are common during the school year when big groups of kids and teens are in close quarters.

The **bacteria that cause** strep throat tend to hang out in the nose and throat. So normal activities like sneezing, coughing, or shaking hands can easily spread an infection from one person to another.

Kids with untreated strep throat are more likely to spread the infection when their symptoms are most severe, but can still infect others for up to 3 weeks.

That's why it's so important to teach kids the importance of hand washing. Good hygiene can lessen their chances of getting contagious diseases like strep throat.

Strep Throat's Diagnose

If your child has a sore throat and other strep throat symptoms, call your doctor. The doctor will likely do a rapid strep test in the office, using a cotton swab to take a sample of the fluids at the back of the throat. The test only takes about 5 minutes.

If it's positive, your child has strep throat. If it's negative, the doctor will send a sample to a lab for a throat culture. The results are usually available within a few days.

How Is Strep Throat Treated?

Doctors usually prescribe about 10 days of antibiotic medicine to treat strep throat. Within about 24 hours after starting on antibiotics, your child probably won't have a fever and won't be contagious. By the second or third day, other symptoms should start to go away.

Even when kids feel better, they should take the antibiotics as prescribed. This is the best way to kill the harmful bacteria. Otherwise, bacteria can remain in the throat and symptoms can return. Completing all the antibiotics also prevents other health problems that a strep infection can cause, such as rheumatic fever (which can cause heart damage), scarlet fever, blood infections, or kidney disease.

To prevent spreading strep throat to others in your home:

Keep your child's eating utensils, dishes, and drinking glasses separate and wash them in hot, soapy water after each use.

Make sure your child doesn't share food, drinks, napkins, handkerchiefs, or towels with other family members.

Teach your child to cover all sneezes or coughs. If a tissue isn't handy, kids should sneeze or cough into a shirtsleeve, not their hands.

Remind everyone to wash their hands well and often.

Give your child a new toothbrush after the antibiotic treatment starts and he or she is no longer contagious.

For parents' education

Home care can help your child feel better while battling strep throat. Give plenty of liquids to prevent dehydration, such as water or ginger ale, especially if he or she has had a fever. Avoid orange juice, grapefruit juice, lemonade, or other acidic beverages, which can irritate a sore throat. Warm liquids like soups, sweetened tea, or hot chocolate can be soothing.

Talk to your doctor about when your child can return to normal activities. Most kids can go back to school when they've taken antibiotics for at least 24 hours and no longer have a fever.

Diseases Caused by Group A Strep

Bacteria called group A *Streptococcus* (group A strep) can cause many different infections. These infections range from minor illnesses to very serious and deadly diseases.

Pharyngitis (Strep Throat)

https://www.cdc.gov/groupastrep/diseases-hcp/strep-throat.html
Many viruses and bacteria can cause acute pharyngitis.

Streptococcus pyogenes, which are also called group A *Streptococcus* or group A strep, cause acute pharyngitis known as strep throat.

Etiology

Group A strep pharyngitis is an infection of the oropharynx, caused by *S. pyogenes*. *S. pyogenes* are gram-positive cocci that grow in chains (see figure 1). They exhibit *β*-hemolysis (complete hemolysis) when grown on blood agar plates. They belong to group A Lancefield classification system for β-hemolytic *Streptococcus*, and thus are **called group A streptococci**.

Clinical Features

- Group A strep pharyngitis is an acute pharyngitis that commonly presents with
- Sudden-onset of sore throat
- Odynophagia - painful swallowing, drinking and eating food
- Fever

Other symptoms may include headache, abdominal pain, nausea, and vomiting — especially among children. Patients with group A strep pharyngitis typically do not typically have cough, rhinorrhea, hoarseness, oral ulcers, or conjunctivitis. These symptoms strongly suggest a viral etiology.

On clinical examination, patients with group A strep pharyngitis usually have

- Pharyngeal and tonsillar erythema
- Tonsillar hypertrophy with or without exudates
- Palatal petechiae
- Anterior cervical lymphadenopathy

Patients with group A strep pharyngitis may also present with a scarlatiniform rash. The resulting syndrome is called scarlet fever or scarlatina.

Respiratory disease caused by group A strep infection in children younger than 3 years old rarely manifests as acute pharyngitis. These children usually have mucopurulent rhinitis followed by fever, irritabilityგაღიზიანება, and anorexiaუმადობა (called "streptococcal fever" or "streptococcosis"). In contrast to typical acute group A strep pharyngitis, this presentation in young children is subacute and high fever is rare.

Transmission

Group A strep pharyngitis is most commonly spread through direct person-to-person transmission. Typically transmission occurs through saliva or nasal secretions from an infected person. People with group A strep pharyngitis are much more likely to transmit the bacteria to others than asymptomatic pharyngeal carriers. Crowded conditions — such as those in schools, daycare centers, or military training facilities — facilitate transmission. Although rare, spread of group A strep infections may also occur via food. Foodborne outbreaks of pharyngitis have occurred due to improper food handling. household items like plates or toys, are very unlikely to spread these bacteria.

Humans are the primary reservoir for group A strep. There is no evidence to indicate that pets can transmit the bacteria to humans.

Treatment with an appropriate antibiotic for 24 hours or longer generally eliminates a person's ability to transmit group A strep. People with group A strep pharyngitis or scarlet fever should stay home from work, school, or daycare until:

They are afebrileAND24 hours after starting appropriate antibiotic therapy

Incubation Period: The incubation period of group A strep pharyngitis is approximately 2 to 5 days.

Risk Factors Group A strep pharyngitis can occur in people of all ages. It is most common among children 5 through 15 years of age. It is rare in children younger than 3 years of age.

The most common risk factor is close contact with another person with group A strep pharyngitis. Adults at increased risk for group A strep pharyngitis include:

- Parents of school-aged children
- Adults who are often in contact with children
- Crowding, such as found in schools, military barracks, and daycare centers, increases the risk of disease spread.

Diagnosis and Testing

The differential diagnosis of acute pharyngitis includes multiple viral and bacterial pathogens. Viruses are the most common cause of pharyngitis in all age groups. Experts estimate that group A strep, the most common bacterial cause, causes 20% to 30% of pharyngitis episodes in children. In comparison, experts estimate it causes approximately 5% to 15% of pharyngitis infections in adults.

History and clinical examination can be used to diagnose viral pharyngitis when clear viral symptoms are present. Viral symptoms include:

- Cough
- Rhinorrhea
- Hoarseness
- Oral ulcers
- Conjunctivitis

Patients with clear viral symptoms do not need testing for group A strep. However, clinicians cannot use clinical examination to differentiate viral and group A strep pharyngitis in the absence of viral symptoms.

Clinicians need to use either a rapid antigen detection test (RADT) or throat culture to confirm group A strep pharyngitis. RADTs have high specificity for group A strep but varying sensitivities when compared to throat culture. Throat culture is the gold standard diagnostic test.

Special Considerations

Clinicians should confirm group A strep pharyngitis in children older than 3 years of age to appropriately guide treatment decisions. Giving antibiotics to children with confirmed group A strep pharyngitis can reduce their risk of developing sequela (acute rheumatic fever). Testing for group A strep pharyngitis is not routinely indicated for:

- Children younger than 3 years of age
- Adults
- Acute rheumatic fever is very rare in those age groups.

Clinicians can use a positive RADT as confirmation of group A strep pharyngitis in children. However, clinicians should follow up a negative RADT in a child with symptoms of pharyngitis with a throat culture. Clinicians should have a mechanism to contact the family and initiate antibiotics if the back-up throat culture is positive.

Treatment

The use of a recommended antibiotic regimen to treat group A strep pharyngitis:

- Shortens the duration of symptoms
- Reduces the likelihood of transmission to family members, classmates, and other close contacts
- Prevents the development of complications, including acute rheumatic fever

When left untreated, the symptoms of group A strep pharyngitis are usually self-limited. However, acute rheumatic fever and suppurative complications (e.g., peritonsillar abscess, mastoiditis) are more likely to occur after an untreated infection. Patients, regardless of age, who have a positive RADT or throat culture need antibiotics. Clinicians should not treat viral pharyngitis with antibiotics.

Penicillin or amoxicillin is the antibiotic of choice to treat group A strep pharyngitis. There has never been a report of a clinical isolate of group A strep that is resistant to penicillin. However, resistance to azithromycin and clarithromycin is common in some communities. For patients with a penicillin allergy, recommended regimens include narrow-spectrum cephalosporins (cephalexin, cefadroxil), clindamycin, azithromycin, and clarithromycin.

See the resources section for specific treatment guidelines for adult and pediatric patients[1,2,3].

Table: **Antibiotic Regimens Recommended for Group A Streptococcal Pharyngitis**

Drug, Route	Dose or Dosage	Duration or Quantity
For individuals without penicillin allergy		
Penicillin V, oral	Children: 250 mg twice daily or 3 times daily; adolescents and adults: 250 mg 4 times daily or 500 mg twice daily	10 days
Amoxicillin, oral	50 mg/kg once daily (max = 1000 mg); alternate: 25 mg/kg (max = 500 mg) twice daily	10 days
Benzathine penicillin G, intramuscular	<27 kg: 600 000 U; ≥27 kg: 1 200 000 U	1 dose
For individuals with penicillin allergy		
Cephalexin,[a] oral	20 mg/kg/dose twice daily (max = 500 mg/dose)	10 days
Cefadroxil,[a] oral	30 mg/kg once daily (max = 1 g)	10 days
Clindamycin, oral	7 mg/kg/dose 3 times daily (max = 300 mg/dose)	10 days
Azithromycin,[b] oral	12 mg/kg once (max = 500 mg), then 6 mg/kg (max=250 mg) once daily for the next 4 days	5 days
Clarithromycin[b], oral	7.5 mg/kg/dose twice daily (max = 250 mg/dose)	10 days

Abbreviation: Max, maximum.
[a] Avoid in individuals with immediate type hypersensitivity to penicillin.

[b] Resistance of group A strep to these agents is well-known and varies geographically and temporally.

From: Shulman ST, Bisno AL, Clegg HW, Gerber MA, Kaplan EL, Lee G, et al. Clinical Practice Guideline for the Diagnosis and Management of Group A Streptococcal Pharyngitis: 2012 Update by the Infectious Diseases Society of AmericaExternal. *Clin Infect Dis*. 2012;55(10):e86–e102, Table 2 (adapted) and it's erratumExternal (*Clin Infect Dis*. 2014;58(10):1496).

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Carriage

Asymptomatic group A strep carriers usually do not require treatment. Carriers have positive throat cultures or are RADT positive, but do not have clinical symptoms or an immunologic response to group A strep antigens on laboratory testing. Compared to people with symptomatic pharyngitis, carriers are much less likely to transmit group A strep to others. Carriers are also very unlikely to develop suppurative or nonsuppurative complications.

Some people with recurrent episodes of acute pharyngitis with evidence of group A strep by RADT or throat culture actually have recurrent episodes of viral pharyngitis with concurrent streptococcal carriage. **Repeated use of antibiotics among** this subset of patients **is unnecessary**. However, identifying carriers clinically or by laboratory methods can be very difficult. The Infectious Diseases Society of America guidelines and Red Book address determining someone if is a carrier and their management.[1, 2]

Prognosis and Complications

Rarely, suppurative and nonsuppurative complications can occur after group A strep pharyngitis. Suppurative complications result from the spread of group A strep from the pharynx to adjacent structures. They can include:

- Peritonsillar abscess
- Retropharyngeal abscess
- Cervical lymphadenitis
- Mastoiditis

Other focal infections or sepsis are even less common.

Acute rheumatic fever is a nonsuppurative sequelae of group A strep pharyngitis. Post-streptococcal glomerulonephritis is a nonsuppurative sequelae of group A strep pharyngitis or skin infections. These complications occur after the original infection resolves and involve sites distant to the initial group A strep infection site. They are thought to be the result of the immune response and not of direct group A strep infection.

Prevention

Good hand hygiene and respiratory etiquette can reduce the spread of all types of group A strep infection. Hand hygiene is especially important after coughing and sneezing and before preparing foods or eating. Good respiratory etiquette involves covering your cough or sneeze. Treating an infected person with an antibiotic for 24 hours or longer generally eliminates their ability to transmit the bacteria. Thus, people with group A strep pharyngitis should stay home from work, school, or daycare until:

They are afebrile at least 24 hours after starting appropriate antibiotic therapy

Epidemiology and Surveillance

Humans are the only reservoir for group A strep. It is most common among children 5 through 15 years of age. It is rare in children younger than 3 years of age. group A strep pharyngitis is most common during the winter and spring.

CDC does not track the incidence of group A strep pharyngitis or other non-invasive group A strep infections. CDC tracks invasive group A strep infections through the Active Bacterial Core surveillance (ABCs) program. For information on the incidence of invasive group A strep infections.

Visit the ABCs Surveillance Reports website.

First Aid: Sore Throat

Throat is a tube that carries food to your esophagus and air to your windpipe and larynx (also called the voice box). The technical name for the throat is pharynx

Sore throats are common at any age and can be one of the first signs of another illness, like a cold, the flu, or mononucleosis (mono). They also can be caused by a strep throat infection, although this is rare in children younger than 2 years old.

Signs and Symptoms

- painful throat
- fever
- swollen glands in the neck
- bad breath
- scratchiness in the throat
- redness in the back of the mouth

What to Do

Here are some ways kids can relieve sore throat pain:

- sip warm liquids
- gargle with saltwater
- suck on hard candy or throat lozenges (for kids age 4 or older)
- take antiinflammation non -steroid

Get Medical Care if Your Child:

- has trouble swallowing
- isn't drinking liquids
- is drooling (in a young child)
- feels very tired
- has pus in the back of the throat
-

Treatment

A sore throat caused by a viral infection usually lasts five to seven days and doesn't require medical treatment.

To ease pain and fever, many people turn to acetaminophen (Tylenol, others) or other mild pain relievers.

Consider giving your child over-the-counter pain medications designed for infants or children, such as acetaminophen (Children's Tylenol, FeverAll, others) or ibuprofen (Children's Advil, Children's Motrin, others), to ease symptoms.

Never give aspirin to children or teenagers because it has been linked to Reye's syndrome.

Treating bacterial infections

If your or your child's sore throat is caused by a bacterial infection, doctor or pediatrician will prescribe antibiotics.

You or your child must take the full course of antibiotics as prescribed even if the symptoms are gone. Failure to take all of the medication as directed can result in the infection worsening or spreading to other parts of the body.

Not completing the full course of antibiotics to treat strep throat can increase a child's risk of rheumatic fever or serious kidney inflammation.

Talk to your doctor or pharmacist about what to do if you forget a dose.

Other treatments

If a sore throat is a symptom of a condition other than a viral or bacterial infection, other treatments will likely be considered depending on the diagnosis.

Think Prevention!Preventing a sore throat startsavoid by:

- not sharing food utensils and glasses with others
- avoiding contact with people who have sore throats or cold symptoms

Scarlet Fever

Scarlet fever (also known as scarlatina) is an illness that can happen in kids who also have strep throat or strep skin infections. Bacteria called group A *Streptococcus* or

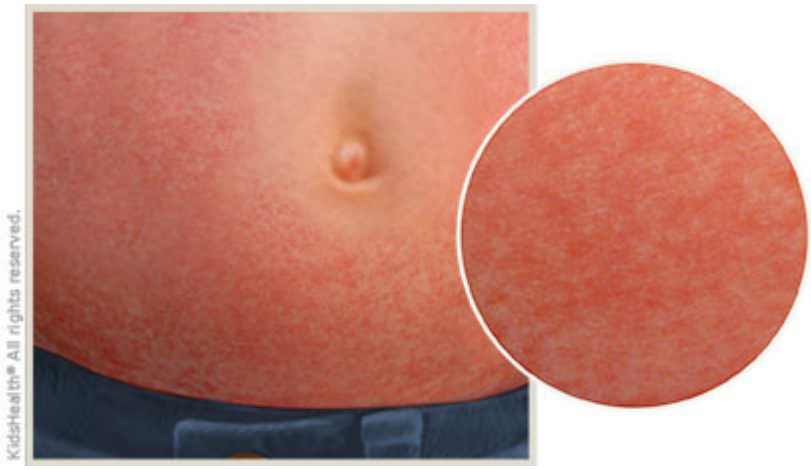
group A strep cause scarlet fever. The strep bacteria make a toxin that causes a bright red, bumpy rash.

The rash spreads over most of the body and is what gives scarlet fever its name. It often looks like a bad sunburn with fine bumps that may feel rough like sandpaper, and it can itch. It usually starts to go away after about 6 days, but might peel for several weeks as the skin heals.

Kids with scarlet fever **doctor**can treat with antibiotics and **help child feel better faster and prevent long-term health problems**

Symptoms of Scarlet Fever

The telltale rash is the main sign of scarlet fever. It usually starts on the neck and face, often leaving a clear area around the mouth. It spreads to the chest and back, then to the rest of the body. In body creases, especially around the underarms, elbows, and groin, the rash forms red streaks.



Other symptoms of scarlet fever include:

- a red, sore throat
- a fever above 101°F (38.3°C)
- swollen glands in the neck

Also, the tonsils and back of the throat might be covered with a whitish coating, or look red, swollen, and dotted with whitish or yellowish specks of pus. Early in the infection, the tongue may have a whitish or yellowish coating. A child with scarlet fever also may have chills, body aches, nausea, vomiting, and loss of appetite.

In rare cases, scarlet fever may develop from a streptococcal skin infection like impetigo. In these cases, the child may not get a sore throat.

In general, scarlet fever is a mild infection. It usually takes two to five days for someone exposed to **group A strep to** become sick. Illness usually begins with a fever

and sore throat. There may also be chills, vomiting, or abdominal pain. The tongue may have a whitish coating and appear swollen. It may also have a “strawberry”-like (red and bumpy) appearance. The throat and tonsils may be very red and sore, and swallowing may be painful.

One or two days after the illness begins, a red rash usually appears. However, the rash can appear before illness or up to 7 days later. The rash may first appear on the neck, underarm, and groin (the area where your stomach meets your thighs). Over time, the rash spreads over the body. The rash usually begins as small, flat blotches that slowly become fine bumps that feel like sandpaper.

Although the cheeks might look flushed (rosy), there may be a pale area around the mouth. Underarm, elbow, and groin skin creases may become brighter red than the rest of the rash. The rash from scarlet fever fades in about 7 days. As the rash fades, the skin may peel around the fingertips, toes, and groin area. This peeling can last up to several weeks.

Scarlet fever, like strep throat, is more common in children than adults. It is most common in children 5 through 15 years old. It is rare in children younger than 3 years old.

Infectious illnesses tend to spread wherever large groups of people gather together. Crowded conditions can increase the risk of getting a group A strep infection. These settings include :

- Schools
- Daycare centers
- Military training facilities

Scarlet Fever’s Diagnose

To confirm whether a child has scarlet fever, doctors usually order a rapid strep test or throat culture (a painless swab of the throat) to check for the strep bacteria.

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Fever’s Prevention

The bacterial infection that causes scarlet fever is contagious. Kids with scarlet fever can spread the bacteria to others through sneezing and coughing. A skin infection caused by strep bacteria, like impetigo, can be passed through contact with the skin.

When a child is sick at home, it's always safest to keep his or her toothbrush, drinking glasses, and eating utensils separate from those of other family members, and to wash these items well in hot soapy water. Wash your own hands often as you care for a child with a strep infection.

For parents education

Eating can be painful for kids with severe strep throat, so serving soft foods or a liquid diet may be best. Include soothing teas and warm nutritious soups, or cool drinks, popsicles, or slushies. Make sure that your child drinks plenty of fluids. You can give over-the-counter.

If the rash itches, make sure that your child's fingernails are trimmed short so skin isn't damaged through scratching. Try an over-the-counter anti-itch medicine-**Antipruritics,** to help relieve the itching

Call the doctor whenever your child suddenly develops a rash, especially if he or she also has a fever, sore throat, or swollen glands. This is especially important if your child has any of the symptoms of strep throat, or if someone in your family or at your child's daycare or school recently had a strep infection.

Scarlet Fever's Treatment

If a **strep infection is confirmed**, the doctor will prescribe an **antibiotic for a child** to take for about 10 days. That usually will cure the infection itself, but it may take a few weeks for the tonsils and swollen glands to return to normal.

https://www.cdc.gov/groupastrep/diseases-public/scarlet-fever.html
Doctors treat scarlet fever with antibiotics. Either penicillin or amoxicillin are recommended as a first choice for people who are not allergic to penicillin. Doctors can use other antibiotics to treat scarlet fever in people who are allergic to penicillin.

Table: Antibiotic Regimens Recommended for Group A Streptococcal Pharyngitis

Drug, Route	Dose or Dosage	Duration or Quantity
For individuals without penicillin allergy		
Penicillin V, oral	Children: 250 mg twice daily or 3 times daily; adolescents and adults: 250 mg 4 times daily or 500 mg twice daily	10 days
Amoxicillin, oral	50 mg/kg once daily (max = 1000 mg); alternate: 25 mg/kg (max = 500 mg) twice daily	10 days
Benzathine penicillin G, intramuscular	<27 kg: 600 000 U; ≥27 kg: 1 200 000 U	1 dose
For individuals with penicillin allergy		
Cephalexin,[a] oral	20 mg/kg/dose twice daily (max = 500 mg/dose)	10 days
Cefadroxil,[a] oral	30 mg/kg once daily (max = 1 g)	10 days

Table: Antibiotic Regimens Recommended for Group A Streptococcal Pharyngitis

Drug, Route	Dose or Dosage	Duration or Quantity
Clindamycin, oral	7 mg/kg/dose 3 times daily (max = 300 mg/dose)	10 days
Azithromycin,[b] oral	12 mg/kg once (max = 500 mg), then 6 mg/kg (max=250 mg) once daily for the next 4 days	5 days
Clarithromycin[b], oral	7.5 mg/kg/dose twice daily (max = 250 mg/dose)	10 days

Long-term Health Problems Are Not Common but Can Happen

Complications are rare but can occur after having scarlet fever. This can happen if the bacteria spread to other parts of the body. Complications can include:

- Abscesses (pockets of pus) around the tonsils
- Swollen lymph nodes in the neck
- Ear, sinus, and skin infections
- Pneumonia (lung infection)
- Rheumatic fever (a heart disease)
- Post-streptococcal glomerulonephritis (a kidney disease)
- Arthritis (joint inflammation)

Treatment with antibiotics can prevent most of these health problems.

Protect Yourself and Others

People can get scarlet fever more than once. Having scarlet fever does not protect someone from getting it again in the future. **While there is no vaccine to prevent scarlet fever**, there are things people can do to protect themselves and others.

Good Hygiene Helps Prevent Group A Strep Infections

The best way to keep from getting or spreading group A strep is to wash your hands often. This is especially important after coughing or sneezing and before preparing foods or eating. To practice good hygiene you should:

- Cover your mouth and nose with a tissue when you cough or sneeze
- Put your used tissue in the waste basket
- Cough or sneeze into your upper sleeve or elbow, not your hands, if you don't have a tissue
- Wash your hands often with soap and water for at least 20 seconds
- Use an alcohol-based hand rub if soap and water are not available
- You should also wash glasses, utensils, and plates after someone who is sick uses them. These items are safe for others to use once washed.

Antibiotics Help Prevent Spreading the Infection to Others

- People with scarlet fever should stay home from work, school, or daycare until they:
- No longer have a fever
- Have taken antibiotics for at least 24 hours
- Take the prescription exactly as the doctor says to. Don’t stop taking the medicine, even if child feel better, unless the doctor says to stop.

Whooping Cough (Pertussis)

Whooping cough (pertussis) is an infection of the respiratory system caused by the bacterium *Bordetella pertussis* (or *B. pertussis*). It mainly affects babies younger than 6 months old who aren't yet protected by immunizations, and kids 11 to 18 years old whose immunity has started to fade.

Whooping cough causes severe coughing spells, which can sometimes end in a "whooping"წამოკივლერბა sound when the child breathes in.

Signs & Symptoms

- The first symptoms of whooping cough are similar to those of a common cold:
- runny nose
- sneezing
- mild cough
- low-grade fever

After about 1 to 2 weeks, the dry, irritating cough evolves into coughing spells. During a coughing spell, which can last for more than a minute, a child may turn red or purple. At the end of a spell, the child may make the characteristic whooping sound when breathing in or may vomit. Between spellsწამოკივლება, the child usually feels well.

While many infants and younger kids with whooping cough develop the coughing fits and accompanying whoop, not all do. And sometimes babies don't cough or whoop as older kids do. Infants may look as if they're gasping for air with a reddened face and may actually stop breathing (this is called apnea) for a few seconds during very bad spells.

Adults and teens may have milder or different symptoms, such as a prolonged cough (rather than coughing spells) or coughing without the whoop.

Contagiousness

Pertussis is highly contagious. The bacteria spread from person to person through tiny drops of fluid from an infected person's nose or mouth. These may become airborne when the person sneezes, coughs, or laughs. Others then can become infected by

inhaling the drops or getting the drops on their hands and then touching their mouths or noses.

Infected people are most contagious during the earliest stages of the illness for up to about 2 weeks after the cough begins. Antibiotics shorten the period of contagiousness to 5 days following the start of antibiotic treatment.

Prevention

Whooping cough can be prevented with the pertussis vaccine, which is part of the DTaP (diphtheria, tetanus, acellular pertussis) immunization.

DTaP immunizations are routinely given in five doses before a child's sixth birthday. For additional protection in case immunity fades, experts recommend that kids ages 11-18 get a booster shot of the new combination vaccine (called Tdap), ideally when they're 11 or 12 years old.

The Tdap vaccine is similar to DTaP but with lower concentrations of diphtheria and tetanus toxoid. It also should be given to adults who did not receive it as preteens or teens. The vaccine is also recommended for all pregnant women during the second half of each pregnancy, regardless of whether or not they had the vaccine before, or when it was last given.

Getting the vaccine is especially important for people who are in close contact with infants, because babies can develop severe and potentially life-threatening complications from whooping cough. An adult's immunity to whooping cough lessens over time, so getting vaccinated and protecting yourself against the infection also helps protect your infant or child from getting it.

As is the case with all immunization schedules, there are important exceptions and special circumstances. doctor will have the most current information.

People who live with or come into close contact with someone who has pertussis should receive antibiotics to prevent the spread of the disease, even if they've already been vaccinated against it. Young kids who have not received all five doses of the vaccine may need a booster dose if exposed to an infected family member.

Incubation& Duration

The incubation period (the time between infection and the start of symptoms) for whooping cough is usually 7 to 10 days, but can be as long as 21 days.

Pertussis usually causes prolonged symptoms — 1 to 2 weeks of common cold symptoms, followed by up to 3 months of severe coughing.

The last stage consists of another few weeks of recovery with gradual clearing of symptoms. In some children, the recovery period can last for months.

Treatment

Call the doctor if you suspect that your child has whooping cough. To make a diagnosis, the doctor will take a medical history, do a thorough physical exam, and may take nose and throat mucus samples to be checked in a lab. Blood tests and a chest X-ray also might be done.

Whooping cough is treated with antibiotics. Many experts believe that antibiotics are most effective in shortening the length of the infection when they're given in the first stage of the illness, **before** coughing spells begin. But even if antibiotics are started later, they're still important because they can stop the spread of the pertussis infection to others. Ask your doctor whether preventive antibiotics or vaccine boosters for other family members are needed.

Some kids with whooping cough need to be treated in a hospital. Babies and younger children are more likely to be hospitalized because they're at greater risk for problems like pneumonia. Whooping cough can be life-threatening for infants younger than 6 months, so they almost always need hospital treatment.

Other potential complications include difficulty breathing, periods of apnea, needing oxygen (particularly during a coughing spell), and dehydration.

While in the hospital, a child may need suctioning to clear the airways. Breathing will be watched closely, and oxygen given if needed. Intravenous (IV) fluids might be needed if a child shows signs of dehydration or has difficulty eating. Precautions will be taken to prevent the infection from spreading to other patients, hospital staff, and visitors.

Home Care

If your child is being treated for pertussis at home, follow the schedule for giving antibiotics exactly as doctor prescribed. Giving cough medicine probably will not help, as even the strongest usually can't relieve the coughing spells of whooping cough. The cough is actually the body's way of trying to clear the airways. (Due to potential side effects, cough medicines **are never recommended** for children under age 6.)

During recovery, let your child rest in bed and use a cool-mist vaporizer to help soothe irritated lungs and breathing passages. (Be sure to follow directions for keeping it clean and mold-free.) And keep your home free of irritants that can trigger coughing spells, such as aerosol sprays; tobacco smoke; and smoke from cooking, fireplaces, and wood-burning stoves.

Kids with whooping cough may vomit or not eat or drink much because of the coughing. So offer smaller, more frequent meals and encourage your child to drink lots of fluids. Watch for signs of dehydration, including thirst, irritability, restlessness,

lethargy, sunken eyes, a dry mouth and tongue, dry skin, crying without tears, and fewer trips to the bathroom to pee (or in infants, fewer wet diapers).

For parents

Call the doctor if you think that your child has whooping cough or has been exposed to someone with whooping cough, even if your child has already had all scheduled pertussis immunizations.

- This is especially important if your child has long coughing spells and:
- the coughing make your child's skin or lips turn red, purple, or blue
- your child vomits after coughing
- there's a whooping sound after the cough
- your child has trouble breathing or seems to have brief periods of not breathing (apnea)
- If child has been diagnosed with whooping cough and is being treated at home, get immediate medical care if he or she develops difficulty breathing or shows signs of dehydration.

Neisseria meningitidis

(meningococcus)
are often the causes bacterial meningitis.
Many different types of bacteria can cause bacterial meningitis. In newborns, the most common causes are
group B strep, *E. coli,* and less commonly, *Listeria monocytogenes*.
In older kids, *Streptococcus pneumoniae* (pneumococcus) and ***Neisseria meningitidis*** **(meningococcus)** are often the causes.
Infants with meningitis might have different symptoms.
Babies might be cranky, feed poorly, and be sleepy or hard to wake up.
They also may have a fever or bulging fontanelle (soft spot on head).
Other symptoms of meningitis in babies can include:

- jaundice (a yellowish tint to the skin)
- stiffness of the body and neck
- a lower-than-normal temperature
- a weak suck
- a high-pitched cry

If bacterial meningitis is diagnosed — or even suspected —
will be started intravenous (IV) antibiotics as soon as possible.
Fluids may be given to replace those lost to fever, sweating, vomiting, and poor appetite
Routine immunization can go a long way toward preventing meningitis.
The Hib, measles, mumps, polio, and pneumococcal vaccines can protect against meningitis caused by those germ
Kids also should get the meningococcal conjugate vaccine when they're 11 or 12 years old, with a booster shot at age 16
A newer type of meningococcal vaccine called MenB protects
against a type of meningococcal bacterium not covered by the older vaccine.

Kids 10 years and
older who have a higher risk for infection will also get this vaccine
Avoiding Germs
Kids and adults should wash their hands well and often

Meningitis

Meningitis is an inflammation of the meninges, the membranes that cover the brain and spinal cord.

People of any age can get meningitis. But it can spread easily among those living in close quarters, so teens, college students, and boarding-school students are at higher risk for infection.

If dealt with quickly, meningitis can be treated successfully. So it's important to get routine vaccinations, know the signs of meningitis, and get medical care right away if you think that your child has the illness.

Most cases are caused by bacteria or viruses, but some can be due to certain medicines or illnesses.

Many of the bacteria and viruses that cause meningitis are fairly common and cause other routine illnesses. Both kinds of meningitis spread like most other common infections do — someone who's infected touches, kisses, or coughs or sneezes on someone who isn't infected.

Bacterial Meningitis

Bacterial meningitis is rare, but is usually serious and can be life-threatening if not treated right away.

In some cases of bacterial meningitis, the bacteria spread to the meninges from a severe head trauma or a severe local infection, such as a serious ear infection (otitis media) or nasal sinus infection (sinusitis).

Many different types of bacteria can cause bacterial meningitis. In newborns, the most common causes are group B strep, *E. coli,* and less commonly, *Listeria monocytogenes*. In older kids, *Streptococcus pneumoniae* (pneumococcus) and *Neisseria meningitidis* (meningococcus) are often the causes.

Viral Meningitis

Viral meningitis (also called **aseptic meningitis**) is more common than bacterial meningitis and usually less serious.

Many of the viruses that cause meningitis are common, such as those that cause colds, diarrhea, cold sores, and the flu.

Symptoms of Meningitis

Meningitis symptoms vary, depending on the person's age and the cause of the infection. The first symptoms can come on quickly or start several days after someone has had a cold, diarrhea, vomiting, or other signs of an infection.

Common symptoms include:

- fever
- lack of energy
- irritability
- headache
- sensitivity to light
- stiff neck
- skin rash

Meningitis in Infants

Infants with meningitis might have different symptoms. Babies might be cranky, feed poorly, and be sleepy or hard to wake up. It may be hard to comfort them, even when they're picked up and rocked. They also may have a fever or bulging fontanelle (soft spot on head).

Other symptoms of meningitis in babies can include:

- jaundice (a yellowish tint to the skin)
- stiffness of the body and neck
- a lower-than-normal temperature
- a weak suck
- a high-pitched cry

Bacterial meningitis can be very serious. So if you see symptoms or think that your child could have meningitis, it's important to see the doctor right away.

If meningitis is suspected, the doctor will order tests, probably including a lumbar puncture (spinal tap) to collect a sample of spinal fluid. This test will show any signs of inflammation and whether the infection is due to a virus or bacteria.

Meningitis' Treatment

Most cases of viral meningitis end within 7 to 10 days. Some people might need to be treated in the hospital, although kids usually can recover at home if they're not too ill. Treatment to ease symptoms includes rest, fluids, and over-the-counter pain medicine.

If bacterial meningitis is diagnosed — or even suspected — doctors will start intravenous (IV) antibiotics as soon as possible. Fluids may be given to replace those lost to fever, sweating, vomiting, and poor appetite.

Complications of bacterial meningitis might need extra treatment. Someone with shock or low blood pressure might get more IV fluids and medicines to increase blood pressure. Some kids may need extra oxygen or mechanical ventilation if they have trouble breathing.

Bacterial meningitis complications can be severe and include neurological problems, such as hearing loss, vision problems, seizures, and learning disabilities. Because impaired hearing is a common complication, those who've had bacterial meningitis should have a hearing test after they recover.

The heart, kidneys, and adrenal glands also might be affected, depending on the cause of the infection. Although some kids develop long-lasting neurological problems, most who get a quick diagnosis and treatment recover fully.

A range of **antibiotics can treat the infection, including penicillin, ampicillin and ceftriaxone. In Africa Ciprofloxacin antibiotic is the antibiotic of choice, and ceftriaxone an alternative**

Meningitis' Prevention

Vaccinations

Routine immunization can go a long way toward preventing meningitis. The Hib, measles, mumps, polio, and pneumococcal vaccines can protect against meningitis caused by those germs.

Kids also should get the meningococcal conjugate vaccine when they're 11 or 12 years old, with a booster shot at age 16. Kids older than 11 who haven't been vaccinated also should be immunized, particularly if they're going to college, boarding school, camp, or other places where they'll live in close quarters with others.

Kids 2 months to 11 years old who are at higher risk for infection should get the meningococcal conjugate. This includes those who:

- live in or travel to countries where infection is common
- have some types of immune disorders
- are present during an outbreak

A newer type of meningococcal vaccine called MenB protects against a type of meningococcal bacterium not covered by the older vaccine. Kids 10 years and older who have a higher risk for infection will also get this vaccine. For other kids, the decision to get the MenB vaccine should be made together with their parents and the doctor.

Avoiding Germs

Kids and adults should wash their hands well and often, particularly before eating and after using the bathroom, and if they work closely with kids (as in a daycare). Avoid

close contact with someone who looks ill and don't share food, drinks, or eating utensils.

In some cases, doctors may give antibiotics to anyone who has been in close contact with a person who has bacterial meningitis to help prevent infection.

For Parents

Get medical care right away if you think that your child has meningitis or you see symptoms such as:

- vomiting
- headache
- tiredness or confusion
- neck stiffness
- rash
- fever

A baby who has a fever, is cranky, and isn't feeding well should be seen right away by a doctor.

If your child has been near someone who has meningitis, call your doctor to ask about preventive medicine.

Meningococcal meningitis WHO

Key facts

Meningococcal meningitis is a bacterial form of meningitis, a serious infection of the thin lining that surrounds the brain and spinal cord.

Meningococcal meningitis is associated with high fatality (up to 50% when untreated) and high frequency (more than 10%) of severe sequelae. Early antibiotic treatment is the most important measure to save lives and reduce complications.

Meningococcal meningitis is observed worldwide but the highest burden of the disease is in the meningitis belt of sub-Saharan Africa, stretching from Senegal in the west to Ethiopia in the east. Around 30 000 cases are still reported each year from that area.

Serogroup specific vaccines are used for prevention (routine immunization) and in response to outbreaks (prompt reactive vaccination).

Since 2010 and the roll-out of a meningococcal A conjugate vaccine through mass preventive immunization campaigns in the meningitis belt, the proportion of the A serogroup has declined dramatically.

A variety of organisms including different bacteria, fungi or viruses, can cause meningitis. Meningococcal meningitis, a bacterial form of meningitis, is a serious infection of the meninges that affects the brain membrane. It can cause severe brain damage and is fatal in 50% of cases if untreated.

Meningococcal meningitis, caused by *Neisseria meningitidis* bacteria, is of particular importance due to its potential to cause large epidemics. Twelve types of *N. meningitides*, called serogroups, have been identified, six of which (A, B, C, W, X and Y) can cause epidemics.

Meningococcal meningitis is observed in a range of situations, from sporadic cases, small clusters, to huge epidemics throughout the world, with seasonal variations. The disease can affect anyone of any age, but mainly affects babies, preschool children and young people.

The geographic distribution and epidemic potential differ according to the serogroup. There are no reliable estimates of global meningococcal disease burden due to inadequate surveillance in several parts of the world. The largest burden of meningococcal disease occurs in an area of sub-Saharan Africa known as the meningitis belt, which stretches from Senegal in the west to Ethiopia in the east (26 countries). During the dry season between December to June, dust winds, cold nights and upper respiratory tract infections combine to damage the nasopharyngeal mucosa, increasing the risk of meningococcal disease. At the same time, transmission of *N. meningitidis* may be facilitated by overcrowded housing. This combination of factors explains the large epidemics which occur during the dry season in the meningitis belt.

Transmission

Neisseria meningitidis only infects humans; there is no animal reservoir. The bacteria are transmitted from person-to-person through droplets of respiratory or throat secretions from carriers. Smoking, close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters with a carrier – facilitates the spread of the disease. Transmission of *N. meningitidis* is facilitated during mass gatherings (recent examples include the Haj pilgrimage, and jamborees).

The bacteria can be carried in the throat and sometimes overwhelms the body's defences allowing the bacteria to spread through the bloodstream to the brain. It is believed that 1% to 10% of the population carries *N. meningitidis* in their throat at any given time. However, the carriage rate may be higher (10% to 25%) in epidemic situations.

Symptoms

The average incubation period is four days, but can range between two and 10 days. The most common symptoms are a stiff neck, high fever, sensitivity to light, confusion, headaches and vomiting. In addition in infants bulging fontanelle and ragdoll appearance are commonly found. A less common but even more severe (often fatal) form of meningococcal disease is meningococcal septicaemia, which is characterized by a haemorrhagic rash and rapid circulatory collapse. Even when the disease is diagnosed early and adequate treatment is started, 8% to 15% of patients die, often within 24 to 48 hours after the onset of symptoms. If untreated, meningococcal meningitis is fatal in 50% of cases and may result in brain damage, hearing loss or disability in 10% to 20% of survivors.

Diagnosis

Initial diagnosis of meningococcal meningitis can be made by clinical examination followed by a lumbar puncture showing a purulent spinal fluid. The bacteria can sometimes be seen in microscopic examinations of the spinal fluid. The diagnosis is supported or confirmed by growing the bacteria from specimens of spinal fluid or blood, by agglutination tests or by polymerase chain reaction (PCR). The identification of the serogroups and susceptibility testing to antibiotics are important to define control measures.

Surveillance

Surveillance, from case detection to investigation and laboratory confirmation is essential to the control of meningococcal meningitis. Main objectives include:

- Detect and confirm outbreaks.
- Monitor the incidence trends, including the distribution and evolution of meningococcal serogroups.
- Estimate the disease burden.
- Monitor the antibiotic resistance profile.
- Monitor the circulation, distribution and evolution of specific meningococcal strains (clones).
- Estimate the impact of meningitis control strategies, particularly preventive vaccination programs.

Treatment

Meningococcal disease is potentially fatal and should always be viewed as a medical emergency. Admission to a hospital or health centre is necessary. Isolation of the patient is not necessary. Appropriate antibiotic treatment must be started as soon as

possible, ideally after the lumbar puncture has been carried out if such a puncture can be performed immediately. If treatment is started prior to the lumbar puncture it may be difficult to grow the bacteria from the spinal fluid and confirm the diagnosis. However confirmation of the diagnosis should not delay treatment.

A range of **antibiotics can treat the infection, including penicillin, ampicillin and ceftriaxone.** Under epidemic conditions **in Africa** in areas with limited health infrastructure and resources**, ceftriaxone is the drug of choice.**

Prevention&Vaccination

Licensed vaccines against meningococcal disease have been available for more than 40 years. Over time, there have been major improvements in strain coverage and vaccine availability, but to date no universal vaccine against meningococcal disease exists. Vaccines are serogroup specific and confer varying degrees of duration of protection.

There are three types of vaccines available:

- Polysaccharide vaccines are used during a response to outbreaks, mainly in Africa:
- They are either bivalent (serogroups A and C), trivalent (A, C and W), or tetravalent (A, C, Y and W).
- They are not effective before 2 years of age.
- They offer a 3-year protection but do not induce herd immunity.
- Conjugate vaccines are used in prevention (into routine immunization schedules and preventive campaigns) and outbreak response:

They confer longer-lasting immunity (5 years and more), prevent carriage and induce herd immunity.

They can be used as soon as of one year of age.
Available vaccines include:
- Monovalent C
- Monovalent A
- Tetravalent (serogroups A, C, Y, W).

Protein based vaccine, against *N. meningitidis B*. It has been introduced into the routine immunization schedule (one country as of 2017) and used in outbreak response.

Chemoprophylaxis

- Antibiotic prophylaxis for close contacts, when given promptly, decreases the risk of transmission.

- Outside the African meningitis belt, chemoprophylaxis is recommended for close contacts within the household.
- In the meningitis belt, chemoprophylaxis for close contacts is recommended in non-epidemic situations.

Ciprofloxacin antibiotic is the antibiotic of choice, and ceftriaxone an alternative.

Cholera

Cholera is a bacterial infection of the intestines. The good news is, cholera is easy to treat if it's caught early. People who have mild to moderate cases usually get better within a week. Even those with severe cases recover fully in a week or so if they get medical care.

Symptoms of Cholera

When someone is infected with cholera bacteria, symptoms can appear in a few hours or as late as 5 days later. Some people have no signs or symptoms, but some cases are severe and can be life-threatening.

Common symptoms of cholera and the dehydration it causes include:
- watery, pale-colored diarrhea, often in large amounts
- nausea and vomiting
- cramps, particularly in the abdomen and legs
- irritability, lack of energy, or unusual sleepiness
- glassy or sunken eyes
- dry mouth and extreme thirst
- dry, shriveled skin
- low urine (pee) output and a lack of tears
- irregular heartbeat (arrhythmia) and low blood pressure

Cholera can cause watery diarrhea and vomiting, making people who have it get dehydrated quickly. When dehydration is severe, it can cause serious health problems if it's not treated. It can even cause seizures and kidney failure. People who don't get the proper medical treatment may even die.

Causes of Cholera

People get it from drinking water or eating food that's contaminated with a type of bacteria called *Vibrio cholerae*.

Cholera is mostly found in the tropics — in particular Asia, Africa, Latin America, India, and the Middle East. It's rare in the United States, but people can still get it. People who travel from countries where the infection is more common can bring cholera into the U.S. Some people in the U.S. have become sick from eating raw and undercooked shellfish from the Gulf of Mexico.

People get cholera from eating or drinking food or water that's been contaminated with the feces of someone who has cholera. This is one reason why cholera is rare in countries with good sanitation systems. Things like flush toilets, sewer systems, and water treatment facilities keep poop out of the water and food supply.

But for people living in places without good sanitation, cholera is more of a risk. Cholera epidemics can also sometimes happen after a disaster (like an earthquake or flood) if people are living in tent cities or other places without running water or proper sanitation systems.

Cholera is not contagious, and rarely spreads through direct contact with another person.

For parents education

If your child develops symptoms of cholera, especially after visiting an area where the disease is common, call your doctor or get medical help right away. Severe dehydration can happen very quickly, so it's essential to start replacing lost fluids right away.

For severe diarrhea or vomiting, call a doctor immediately, even if you're pretty sure it's not cholera. Dehydration is a serious medical condition regardless of the cause, and it needs to be treated quickly before it can damage internal organs.

How Is Cholera Diagnosed?

To confirm a diagnosis of cholera, doctors may take a stool sample or vomit sample to check for signs of the bacteria.

Cholera's Treatment

Cholera needs immediate treatment because severe dehydration can happen within hours. Fortunately, treatment is simple and very effective. Very few people who get treatment die.

The goal of cholera treatment is to replace all the fluids and electrolytes (salts) lost through diarrhea and vomiting. For mild dehydration, a doctor may recommend drinking an over-the-counter rehydration solution. People with more severe cases of cholera may need to stay in the hospital and get intravenous (IV) fluids.

Sometimes doctors prescribe antibiotics to treat cholera. The antibiotics are not as important as rehydrating, but they can help shorten the length of time a person is sick. They also might make cholera-related diarrhea less severe. Sometimes doctors also prescribe zinc supplements.

Anti-diarrheal medicines can actually make the symptoms of cholera worse, so people who think they may have cholera should avoid taking them.

Can Cholera Be Prevented?

In some areas cholera vaccines are given to help protect people against cholera for a short while. Because cholera isn't a problem in the United States, the vaccine is not offered here.

If you're going to an area that has cholera, protect your family from the disease by following a few simple precautions:

Boil or disinfect any water that you'll use for drinking, washing or preparing food, making ice, making coffee or tea, or brushing teeth. Choose bottled water or other drinks that come in sealed cans or bottles. Be sure to wipe the outside of the can or bottle before you drink from it, though. Avoid tap water, fountain drinks, and drinks with ice cubes.

Fully cook all food, especially seafood. Avoid food from street vendors. Instead, eat packaged foods and meals that are freshly cooked and served hot. Avoid sushi and any other raw or partly cooked seafood.

Avoid raw vegetables, including salads, and fruits that have already been peeled or cannot be peeled like grapes and berries. Bananas, avocados, and oranges make better choices.

Dairy foods are often contaminated, so be careful with things like ice cream, milk, and cheese. Eat only pasteurized dairy and be sure dairy foods are refrigerated and kept cold.

Wash your hands well and often with soap and clean water, especially after you use the bathroom or before you prepare food. If no soap and water are available, use a hand cleaner that's at least 60% alcohol.

Cholera, Key facts

Cholera is an acute diarreal disease that can kill within hours if left untreated.

Researchers have estimated that each year there are 1.3 million to 4.0 million cases of cholera, and 21 000 to 143 000 deaths worldwide due to cholera (1).

Up to 80% of cases can be successfully treated with oral rehydration solution (ORS).

Severe cases will need rapid treatment with intravenous fluids and antibiotics.

Provision of safe water and sanitation is critical to control the transmission of cholera and other waterborne diseases.

Safe oral cholera vaccines should be used in conjunction with improvements in water and sanitation to control cholera outbreaks and for prevention in areas known to be high risk for cholera.

A global strategy on cholera control with a target to reduce cholera deaths by 90% was launched in 2017.

Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. Cholera remains a global threat to public health and an indicator of inequity and lack of social development. Researchers have estimated that every year, there are roughly 1.3 to 4.0 million cases, and 21 000 to 143 000 deaths worldwide due to cholera *(1)*.

Symptoms

Cholera is an extremely virulent disease that can cause severe acute watery diarrhoea. It takes between 12 hours and 5 days for a person to show symptoms after ingesting contaminated food or water *(2)*. Cholera affects both children and adults and can kill within hours if untreated.

Most people infected with *V. cholerae* do not develop any symptoms, although the bacteria are present in their faeces for 1-10 days after infection and are shed back into the environment, potentially infecting other people.

Among people who develop symptoms, the majority have mild or moderate symptoms, while a minority develop acute watery diarrhoea with severe dehydration. This can lead to death if left untreated.

History

During the 19th century, cholera spread across the world from its original reservoir in the Ganges delta in India. Six subsequent pandemics killed millions of people across all continents. The current (seventh) pandemic started in South Asia in 1961, and reached Africa in 1971 and the Americas in 1991. Cholera is now endemic in many countries.

Vibrio cholerae strains

There are many serogroups of *V. cholerae*, but only two – O1 and O139 – cause outbreaks. *V. cholerae* O1 has caused all recent outbreaks. *V. cholerae* O139 – first identified in Bangladesh in 1992 – caused outbreaks in the past, but recently has only been identified in sporadic cases. It has never been identified outside Asia. There is no difference in the illness caused by the two serogroups.

Prevention and control

A multifaceted approach is key to control cholera, and to reduce deaths. A combination of surveillance, water, sanitation and hygiene, social mobilisation, treatment, and oral cholera vaccines are used.

Surveillance

Cholera surveillance should be part of an integrated disease surveillance system that includes feedback at the local level and information-sharing at the global level.

Water and sanitation interventions

The long-term solution for cholera control lies in economic development and universal access to safe drinking water and adequate sanitation. Actions targeting environmental conditions include the iimplementation of adapted long-term sustainable WASH solutions to ensure use of safe water, basic sanitation and good hygiene practices in cholera hotspots. In addition to cholera, such interventions prevent a wide range of other water-borne illnesses, as well as contributing to achieving goals related to poverty, malnutrition, and education. The WASH solutions for cholera are aligned with those of the Sustainable Development Goals (SDG 6).

Treatment

Cholera is an easily treatable disease. The majority of people can be treated successfully through prompt administration of oral rehydration solution (ORS). The WHO/UNICEF ORS standard sachet is dissolved in 1 litre (L) of clean water. Adult patients may require up to 6 L of ORS to treat moderate dehydration on the first day.

Severely dehydrated patients are at risk of shock and require the rapid administration of intravenous fluids. These patients are also given appropriate antibiotics to diminish the duration of diarrhoea, reduce the volume of rehydration fluids needed, and shorten the amount and duration of *V. cholerae* excretion in their stool.

Mass administration of antibiotics is not recommended, as it has no proven effect on the spread of cholera may contribute to antimicrobial resistance.

Rapid access to treatment is essential during a cholera outbreak. Oral rehydration should be available in communities, in addition to larger treatment centres that can provide intravenous fluids and 24 hour care. With early and proper treatment, the case fatality rate should remain below 1%.

Zinc is an important adjunctive therapy for children under 5, which also reduces the duration of diarrhoea and may prevent future episodes of other causes of acute watery diarrhoea.

Breastfeeding should also be promoted.

Hygiene promotion and social mobilisation

Health education campaigns, adapted to local culture and beliefs, should promote the adoption of appropriate hygiene practices such as hand-washing with soap, safe preparation and storage of food and safe disposal of the faeces of children.

Oral cholera vaccines

Currently there are three WHO pre-qualified oral cholera vaccines (OCV): Dukoral®, Shanchol™, and Euvichol-Plus®. All three vaccines require two doses for full protection.

Dukoral® is administered with a buffer solution that, for adults, requires 150 ml of clean water. Dukoral can be given to all individuals over the age of 2 years. There must be a minimum of 7 days, and no more than 6 weeks, delay between each dose. Children aged 2 -5 require a third dose. Dukoral® is mainly used for travellers. Two doses of Dukoral® provide protection against cholera for 2 years.

Shanchol™ and Euvichol-Plus® are essentially the same vaccine produced by two different manufacturers. They do not require a buffer solution for administration. They are given to all individuals over the age of one year. There must be a minimum of two weeks delay between each dose of these two vaccines. Two doses of Shanchol™ and Euvichol-Plus® provide protection against cholera for three years, while one dose provides short term protection.

Shanchol™ and Euvichol-Plus® are the vaccines currently available for mass vaccination campaigns through the Global OCV Stockpile. The stockpile is supported by Gavi, the Vaccine Alliance.

Based on the available evidence, the August 2017 WHO Position Paper on Vaccines against Cholera states that:

OCV should be used in areas with endemic cholera, in humanitarian crises with high risk of cholera, and during cholera outbreaks; always in conjunction with other cholera prevention and control strategies;

vaccination should not disrupt the provision of other high priority health interventions to control or prevent cholera outbreaks.

More than 30 million doses of OCV have been used in mass vaccination campaigns. The campaigns have been implemented in areas experiencing an outbreak, in areas at heightened vulnerability during humanitarian crises, and among populations living in highly endemic areas, known as “hotspots”.

More information on cholera vaccines

The 2017 WHO OCV position paper

WHO response

In 2014 the Global Task Force on Cholera Control (GTFCC), with its Secretariat based at WHO, was revitalised. The GTFCC is a network of more than 50 partners active in cholera control globally, including academic institutions, non-governmental organisations and United Nations agencies.

Through the GTFCC and with support from donors, WHO works to:

promote the design and implementation of global strategies to contribute to capacity development for cholera prevention and control globally;

provide a forum for technical exchange, coordination, and cooperation on cholera-related activities to strengthen country capacity to prevent and control cholera;

support countries for the implementation of effective cholera control strategies and monitoring of progress;

disseminate technical guidelines and operational manuals;

support the development of a research agenda with emphasis on evaluating innovative approaches to cholera prevention and control in affected countries; and

increase the visibility of cholera as an important global public health problem through the dissemination of information about cholera prevention and control, and conducting advocacy and resource mobilization activities to support cholera prevention and control at national, regional, and global levels.

More about the Global Task Force on Cholera Control (GTFCC)

Cholera Kits

To ensure efficient and effective deployment of necessary materials for the investigation and confirmation of cholera outbreaks, as well as the treatment of cholera patients, WHO has developed a set of cholera kits.

After consultation with implementing partners, WHO revised the cholera kits in 2016 to better meet field needs. In total there are 6 kits:

- 1 for investigation
- 1 with supplies for laboratory confirmation
- 3 for treatment at the community, peripheral and central levels
- 1 support kit with logistical materials such as solar lamps, fencing and water bladders and taps.

Each treatment kit provides enough material to treat 100 patients.

Protozoa

Protozoa are one-celled organisms, like bacteria. But they are bigger than bacteria and contain a nucleus and other cell structures, making them more like plant and animal cells.

Protozoa love moisture. So intestinal infections and other diseases they cause, like amebiasis and giardiasis, often spread through contaminated water. Some protozoa are parasites. This means they need to live on or in another organism (like an animal or plant) to survive. For example, the protozoa that causes malaria grows inside red blood cells, eventually destroying them. Some protozoa are encapsulated in cysts, which help them live outside the human body and in harsh environments for long periods of time.

Giardiasis

Giardiasis is an illness that affects the digestive tract. It's one of the top causes of diarrhea in the world.

What Causes Giardiasis?

Giardiasis is caused by the microscopic *Giardia* parasite. The parasite attaches itself to the lining of the small intestines in humans, where it causes diarrhea and interfereswith the body's absorption of fats and carbohydrates from digested foods.Once outside the body, *Giardia* can sometimes survive for weeks or months

Giardiasis is very contagious, and can spread easily among families. In childcare centers or any facility caring for a group of people, or people who are traveling, giardiasis can easily pass from person to person.

Giardiasis spreads through water or food contaminated with the stool (poop) of someone who's infected. Animals (mainly dogs and beavers) who have giardiasis also can pass the parasite in their stool. The stool can then contaminate public water supplies, community swimming pools, and water sources like lakes and streams.

Uncooked foods that have been rinsed in contaminated water and surfaces contaminated by stool (for instances, diaper pails and toilet handles) also can spread the infection.

The *Giardia* parasite can survive the normal amounts of chlorine used to purify community water supplies, and can live for more than 2 months in cold water. As few as 10 of the microscopic parasites in a glass of water can cause severe giardiasis in a person who drinks it.

In developing countries, giardiasis is a major cause of epidemic childhood diarrhea. But even people in developed countries can get the infection, especially children younger than 5.

Young kids are more likely to have giardiasis than adults. So some experts think that our bodies gradually develop some form of immunity to the parasite as we get older. But it isn't unusual for an entire family to be infected, with some family members having diarrhea, some just crampy abdominal pains, and others with no symptoms.

Signs and Symptoms of Giardiasis

Many people with giardiasis have no signs or symptoms of illness, even though the parasite is living in their intestines.

When the parasite *does* cause symptoms, the illness usually begins with severe watery diarrhea. Giardiasis affects the body's ability to absorb fats from the diet, so the diarrhea contains unabsorbed fats. That means that the diarrhea floats, is shiny, and smells very bad.

Other symptoms include:

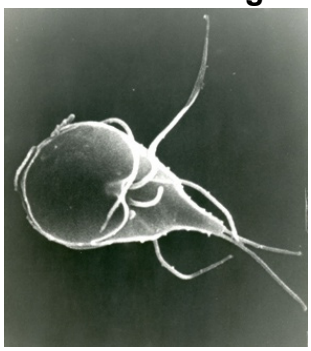
- abdominal cramps
- low energy (malaise)
- lots of intestinal gas
- an enlarged belly from the gas
- loss of appetite
- nausea and vomiting
- sometimes a low-grade fever

These symptoms may last for 5 to 7 days or longer. If they last longer, a child may **lose weight** or show other signs of poor nutrition.

Sometimes, after acute (or short-term) symptoms of giardiasis pass, the disease begins a chronic (or more lasting) phase. Symptoms of **chronic giardiasis** include:

- periods of intestinal gas
- belly pain in the area above the navel (belly button)
- poorly formed, "mushy" bowel movements
- weight loss
- exzreme tiredness

Giardiasis' Diagnosed



To confirm the diagnosis of giardiasis should be taken stool samples that are checked for *Giardia* parasites. Several samples may be needed before the parasites are found. For that reason, the doctor might order a much more sensitive test, the enzyme-linked immunosorbent assay, or ELISA test.

Less often, doctors make the diagnosis by looking at the lining of the small intestine with an instrument called an endoscope and taking samples from inside the intestine to be checked in a lab. This is done in more extreme cases, when a definite cause for the diarrhea hasn't been found.

Treatment of Giardiasis

Giardiasis is treated with prescription medicines that kill the parasites. Treatment takes about 5 to 7 days, and the medicine is usually given as a liquid. Some of these medicines may have side effects.

CDC: Several drugs can be used to treat *Giardia* infection. Effective treatments include metronidazole, tinidazole, and nitazoxanide [1]. Alternatives to these medications include paromomycin, quinacrine, and furazolidone [1,2]. Some of these drugs may not be routinely available in the some regions

Different factors may shape how effective a drug regimen will be, including medical history, nutritional status, and condition of the immune system [3-5]. Therefore, it is important to discuss treatment options with a healthcare provide

If child has giardiasis, be sure to give all doses on schedule for as long as doctor directs. This will help child recover faster and will kill parasites that might infect others in your family. Encourage all family members to wash their hands well and often, especially after using the bathroom and before eating.

A child who has diarrhea from giardiasis may lose too much fluid in the stool and become dehydrated. Make sure the child drinks plenty of liquids but no caffeinated beverages or juice, as they make the body lose water faster.

Any nonprescription drugs for cramps or diarrhea may mask symptoms and interfere with treatment, so be careful.

In most cases, treatment with 5 to 7 days of antiparasitic medicine will help kids recover within a week's time. Medicine also shortens the time that they're contagious. If giardiasis isn't treated, symptoms can last up to 6 weeks or longer.

Giardiasis' Prevention

Some food safety and hygiene precautions can help prevent giardiasis. To help protect your family and children teach them:

- Drink only from water supplies that have been approved by local health authorities.
- Bring your own water when you go camping or hiking. Never drink from sources like mountain streams. Or boil water for at least 10 minutes.
- Wash raw fruits and vegetables well before you eat them.
- Wash your hands well before you cook food for yourself or for your family.
- Teach kids to wash their hands after every trip to the bathroom and especially before eating.
- Wash your hands often if you're caring for someone who has giardiasis.
- Have your kids wash their hands well after handling anything in "touch tanks" in aquariums, a potential source of giardiasis.
- Always wash hands well after changing a diaper.
- Have your water checked on a regular basis if it comes from a well.

Also, it's questionable whether infants and toddlers still in diapers should be sharing public pools. But they definitely should **not** if they're having diarrhea or loose stools (poop).

For Parents

Call the doctor if your child has:

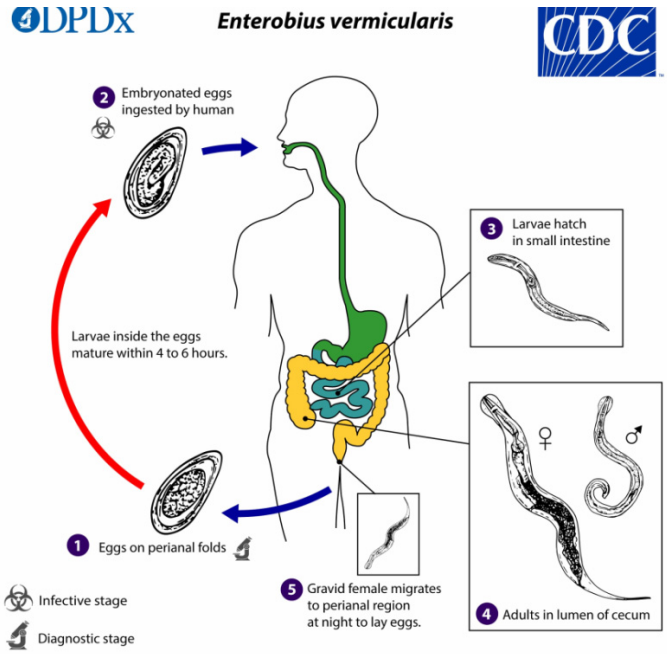
- lots of diarrhea, especially if he or she also has a fever and/or belly pain
- blood in the diarrhea

occasional, small episodes of diarrhea that continue for several days, especially if your child doesn't want to eat much and is either losing weight or isn't gaining weight as expected

Pinworm Infections

Pinworm is an intestinal infection caused by tiny **parasitic** worms. It's a common infection that affects millions of people each year, particularly school-age kids.

If your child develops a pinworm infection, try not to worry. Pinworms don't cause any harm (just itching and restless sleep), and it won't take long to get rid of them.



Pinworm Infections' Spread

Pinworm infections (also known as "seatworm infection" or "threadworm infection") are contagious.

Pinworms get into the body when people ingest or breathe in the microscopic pinworm eggs. These eggs can be found on contaminated hands and surfaces, such as:

- bed linens

- towels
- clothing (especially underwear and pajamas)
- toilets
- bathroom fixtures
- food
- drinking glasses
- eating utensils
- toys
- kitchen counters
- desks or lunch tables at school
- sandboxes

The eggs pass into the digestive system and hatch in the small intestine. From the small intestine, pinworm larvae go to the large intestine, where they live as parasites (with their heads attached to the inside wall of the bowel).

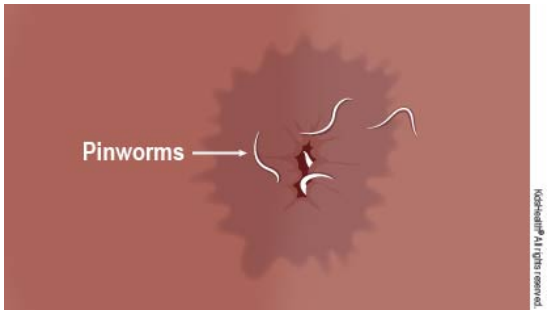
About 1 to 2 months later, adult female pinworms leave the large intestine through the anus They lay eggs on the skin right around the anus, which triggers itching in that area. Often, this happens at night.

When someone scratches the itchy area, microscopic pinworm eggs transfer to their fingers. Contaminated fingers can then carry pinworm eggs to the mouth, where they go back into the body, or stay on various surfaces, where they can live for 2 to 3 weeks.

If you're wondering if your family pet could give child a pinworm infection, it can't. Pinworms don't come from animals.

Signs & Symptoms of Pinworm Infection

The most common signs of a pinworm infection are itching around the anus and restless sleep. The itching is usually worse at night because the worms move to the area around the anus to lay their eggs. In girls, pinworm infection can spread to the vagina and cause a vaginal discharge. If the itching breaks the skin, it also could lead to a bacterial skin infection.



If child has a pinworm infection, you can see worms in the anal region, especially if you look about 2 or 3 hours after child has fallen asleep. You also might see the worms in the toilet after your child goes to the bathroom. They look like tiny pieces of

white thread and are really small — about as long as a staple. You might also see them on child's underwear in the morning.

Belly pain and nausea are less common symptoms but can happen if there are many pinworms in the intestines.

Pinworm Infections' Diagnose

Your doctor may ask you to help make the diagnosis of pinworm by placing a sticky piece of clear cellophane tape against the skin around your child's anus. Pinworm eggs will stick to the tape and can be seen under a microscope. The best time to do this is at night or in the morning before a bath (when there's the most pinworm activity around the anus). The doctor also might take some samples from under a child's fingernails to look for eggs.

Pinworm Infections Treatment

The medications used for the treatment of pinworm are either **mebendazole,pyrantel pamoate,** or **albendazole.** Any of these drugs are given in one dose initially, and then another single dose of the same drug two weeks later. **Pyrantel pamoate** is available without prescription. The medication does not reliably kill pinworm eggs. Therefore, the second dose is to prevent re-infection Health practitioners and parents should weigh the health risks and benefits of these drugs for patients **under 2 years of age**.

Repeated infections should be treated by the same method as the first infection. In households where more than one member is infected or where repeated, symptomatic infections occur, it is recommended that all household members be treated at the same time. In institutions, mass and simultaneous treatment, **repeated in 2 weeks, can be effective**.

The safety of **mebendazole in children has not been established**. There is limited data in children age 2 years and younger. Mebendazole is listed as an intestinal antihelminthic medicine on the WHO Model List of Essential Medicines for Children, intended for the use **of children up to 12 years of age**.

CDC- The safety of **pyrantel pamoate** in children has not been established. According to WHO guidance on preventive chemotherapy, pyrantel may be used in children age 1 year and older during mass treatment programs without diagnosis. **Pyrantel pamoate** is listed as an intestinal antihelminthic medicine on the WHO Model List of Essential Medicines for Children, intended for the use of children up to 12 years of age

CDC The safety of **albendazole** in children less than 6 years old is not certain. Studies of the use of albendazole in children as young as one year old suggest that its use is safe. According to WHO guidelines for mass prevention campaigns, albendazole can be used in children as young as 1 year old. Many children less than 6 years old have been treated in these campaigns with albendazole, albeit at a reduced dose.

If child has a pinworm infection, the doctor will recommend an over-the-counter or prescription antiworm medicine. This is given in one dose and repeated in 2 weeks. The doctor may decide to treat the entire family, especially if your child has had a pinworm infection before.

Although medicine takes care of the worm infection, the itching may continue for about a week. So the doctor also might give your child a cream or other medicine to help stop the itching.

Regular hand washing and routine household cleaning (including frequent changing of underwear, and washing everyone's pajamas, towels, and bed linens) also will help prevent the spread of a pinworm infection within the family.

Pinworm Infections' Prevention

Here are a few ways to prevent pinworm infections in your family:

- Remind kids to wash their hands often, especially after using the toilet, after playing outside, and before eating.
- Make sure your kids shower or bathe every day and change underwear and swimsuits daily.
- Keep kids' fingernails short and clean.
- Tell kids not to scratch around their bottom or bite their nails.
- Wash your kids' pajamas every few days.

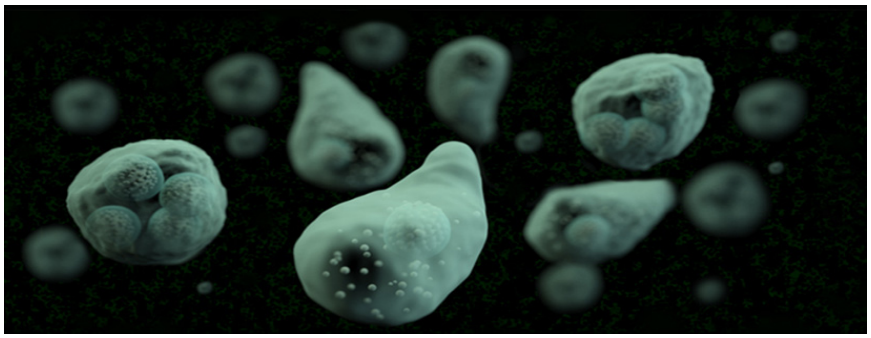
For parents education

Call the doctor if child complains of itchy skin or always seems to be scratching the anal or vaginal area.

Also ask about whether pinworms could be to blame if your child has trouble sleeping or has begun to wet the bed. (Pinworms can irritate the urethra —— and lead to bedwetting.)

Remember that pinworms are quite common among kids and aren't harmful. By taking medicine and following some prevention tips, you'll be rid of the worms in no time.

Amebiasis



Amebiasis is an infection of the intestines with a parasite called *Entamoeba histolytica* (*E. histolytica*). The parasite is an amoeba, a single-celled organism. People can get this parasite by eating or drinking something that's contaminated with it.

Signs & Symptoms of Amebiasis

In many cases, the parasite that causes amebiasis lives in a person's large intestine without causing any symptoms. Other times, it causes:

- diarrhea (which may be bloody)
- stomach pains
- cramping
- nausea
- loss of appetite
- fever

In rare cases, it can spread into other organs such as the liver, lungs, and brain.

For some people, symptoms of amebiasis can begin within days to weeks of swallowing contaminated food or water. For others, symptoms can take months to appear.

CDC Molecular methods are currently recommended for distinguishing pathogenic *Entamoeba* species.

Microscopic Detection
Microscopic identification of cysts and trophozoites in the stool is the common method for diagnosing *pathogenic Entamoeba species*.

Immunodiagnosis
Enzyme immunoassay (EIA) kits for *Entamoeba histolytica* antibody detection as well as EIA kits for antigen detection are commercially available in the United States

Antibody detectionAntigen Detection
Molecular Diagnosis
Conventional PCR

In reference diagnosis laboratories, molecular analysis by conventional PCR-based assays is the method of choice for discriminating between *E. histolytica* and *E. dispar*. Some assays also can distinguish *E. moshkovskii.*

Amebiasis is contagious. People with amoebas in their intestines can pass the infection to others through stool even if they have no symptoms. When infected stool contaminates food or water supplies, amebiasis can spread quickly to many people at once. This is especially true in developing countries, where drinking water may be contaminated.

Amebiasis also can spread between people when hands aren't washed well, contaminated objects are shared, and by sexual contact.

Amebiasis usually happens in areas where living conditions are crowded and unsanitary. The illness is common in parts of Africa, Latin America, and Asia. It is rare in the United States, but is sometimes seen in people who have immigrated from or traveled to countries where amebiasis is more common.

Amebiasis Be Prevention

Because amoebas may contaminate food and water, you can help prevent the illness by being careful about what you eat and drink, especially in developing countries. In those areas, a good rule regarding food is to cook it, boil it, peel it, or forget it. Ice can also be contaminated and should be avoided in these countries.

Everyone should wash their hands well after using the bathroom and before preparing or eating food.

Amebiasis Treatment

Doctors can treat amebiasis with antibiotics . Some people need more treatment, such as extra fluids.

Harvard université- amebiasis is treate **nitroimidazole drugs,** kills amebiasis in blood, the well of the intestine and in lever abscesses.

This drugs **includes metronidazole, (Flagyl) tinidazole (Tindama, Fasigyn)**

For parents

Call your doctor if anyone in your family has signs or symptoms of amebiasis, such as:

- diarrhea with blood or mucus
- diarrhea that lasts longer than 2 weeks
- belly pain
- a fever
- a swollen belly

- pain or tenderness in the area of the liver (below the ribs on the right side)

This is especially important if you have recently traveled to a part of the world where amebiasis is common. Also call the doctor if child has diarrhea and shows signs of being dehydrated, such as a dry or sticky mouth, peeing less than usual, no tears when crying, dizziness, or drowsiness.

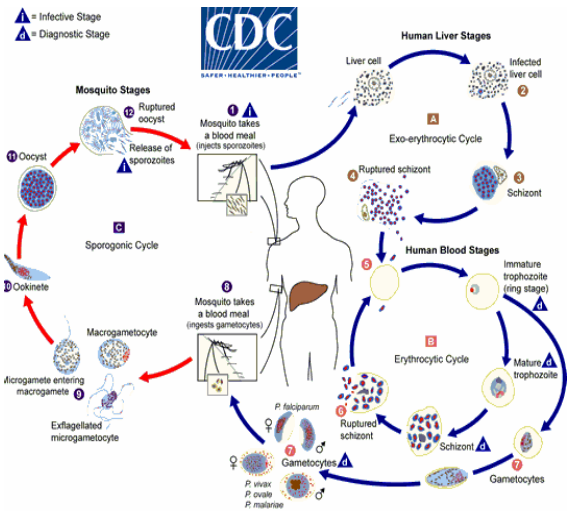
CDC A 3-year-old boy was seen by a pediatrician for gastrointestinal pain and watery diarrhea. His parents conveyed that he has a propensity for putting insects in his mouth and sometimes eating them.A stool specimen was collected and processed for ova and parasites (O&P). A formalin-ethyl acetate (FEA) concentration was performed and a wet mount smear was prepared from the sediment and
examined. Figures **A** and **B** show one parasite-like object at different focal planes at 200x magnification; another object from the sample is shown in Figures **C** and **D**, also at different focal planes, at 200x magnification. What is your diagnosis? Based on what criteria?

Answer his was a case of acanthocephaliasis based on the presence of eggs of both *Macracanthorynchus sp*, and *Moniliformis moniliformis.* Although acanthocephalan eggs are not always produced in human infections, they are identifiable by several features. Morphologic features shown in the Figures included:

Eggs with a thick, dark brown textured shell (Figures **A** and **B**) and size consistent with *Macracanthorynchus sp*. (80—100 x 50 µm).

Eggs with a textured, thick, clear shell (Figures **C** and **D**) and size consistent with *Moniliformis moniliformis* (90—125 x 65 µm).

Malaria



Malaria is a common infection in hot, tropical areas. Very rarely, it also can happen in temperate climates.

Malaria can cause mild illness in some people and life-threatening illness in others. Proper treatment can cure malaria.

Cdc About 2,000 cases of malaria are diagnosed in the United States each year. The vast majority of cases in the United States are in travelers and immigrants returning from countries where malaria transmission occurs, many from sub-Saharan Africa and South Asia.

Malaria was endemic in most of the continental United States and much of Europe into the 20th century.

Although global malaria incidence has declined over the past 10 years, an estimated 219 million new cases of malaria occurred worldwide in 2017, with 92% of them in Africa

Areas, such as Central Asia, South Asia, Southeast Asia, and parts of Latin America and the Caribbean, have varying levels of malaria transmission, rarely reaching hyperendemic or holoendemic levels. These areas also have varying ratios of *P. falciparum* and non-falciparum malaria; many have a higher proportion of non-falciparum malaria (specifically *P. vivax)* than falciparum malaria. Additionally, *P. knowlesi* is found in Southeast Asia and may cause severe morbidity and mortality

What Causes Malaria?

Malaria is caused by parasites carried by mosquitoes. The insects pick up the parasite by biting someone who already has the disease. Malaria is then passed to other people when the mosquitoes bite them.

Rarely, malaria can pass from person to person — from mother to child in "congenital malaria," or through blood transfusion, organ donation, or shared needles.

C The natural history of malaria involves cyclical infection of humans and female *Anopheles* mosquitoes. In humans, the parasites grow and multiply first in the liver cells and then in the red cells of the blood. In the blood, successive broods of parasites grow inside the red cells and destroy them, releasing daughter parasites (“merozoites”) that continue the cycle by invading other red cells.

nopheles mosquito, they mate in the gut of the mosquito and begin a cycle of growth and multiplication in the mosquito. After 10-18 days, a form of the parasite called a sporozoite migrates to the mosquito’s salivary glands. When the *Anopheles* mosquito takes a blood meal on another human, anticoagulant saliva is injected together with the sporozoites, which migrate to the liver, thereby beginning a new cycle

Signs and Symptoms of Malaria

Early symptoms of malaria can include irritability and drowsiness, with poor appetite and trouble sleeping. These symptoms are usually followed by chills, and then a fever

with fast breathing. The fever may either gradually rise over 1 to 2 days or spike very suddenly to 105°F (40.6°C) or higher. Then, as the fever ends and the person's body temperature quickly returns to normal, there is an intense episode of sweating.

The same pattern of symptoms — chills, fever, sweating — may repeat every 2 or 3 days, depending on which malaria parasite is causing the infection.

Other symptoms include headache, nausea, aches and pains all over the body (especially the back and abdomen), and an abnormally large spleen. If malaria affects the brain, someone might have seizures or loss of consciousness. The kidneys can also be affected in some cases.

Worldwide, hundreds of millions of people are infected with malaria each year. Most cases are in sub-Saharan Africa. (Asia, Latin America, and parts of Europe are also affected by malaria.) Every year, there are about 500,000 deaths from malaria worldwide.

Malaria is rare in the United States, and most of these cases are in travelers, military personnel, and immigrants. Malaria can affect people of all ages, but **young children and pregnant women are more likely to develop severe illness**

Malaria's Diagnose

Doctors suspect malaria based on a person's symptoms, physical findings, and where a person lives or has traveled. Doctors might take a blood sample to be checked under a microscope for malaria parasites, which are seen inside infected red blood cells.

In countries where the disease is seen a lot, doctors often treat people for malaria who have a fever with no obvious cause without getting lab tests to prove the person has malaria.

CDC-Rapid and accurate diagnosis of malaria is integral to the appropriate treatment of affected individuals and in preventing the further spread of infection in the community. it is provides reference microscopic diagnosis and other specialized tests such as serology, PCR, and drug-resistance testing.

Malaria's Treatment

Malaria is treated **with anti-malarial drugs given** by mouth, by injection, or intravenously (into the veins). Depending on the parasite causing the malaria, a person might be treated as an outpatient over a few days or in the hospital with IV medicine.

Doctors also watch for signs of dehydration, convulsions, anemia, and other complications that can affect the brain, kidneys, or spleen. A patient may need fluids, blood transfusions, and help with breathing.

If diagnosed early and treated, malaria can usually be cured in about 2 weeks. However, many people who live in areas where malaria is common get repeated infections and never really recover between episodes of illness. Without treatment, the disease can be fatal, especially in children who are malnourished.

Can Malaria Be Prevented?

Health authorities try to prevent malaria by using mosquito-control programs aimed at killing mosquitoes that carry the disease. If you travel to an area of the world with a high risk for malaria, you can install window screens, use insect repellents, and place mosquito netting over beds. Insecticide-impregnated bed netting has successfully lowered the number of malaria deaths among African children.

Check with your doctor before visiting any tropical or subtropical area at high risk for malaria. Your doctor can give your family anti-malarial drugs to prevent the disease, which need to be taken before travel. Several malaria vaccines are currently being developed and tested across the world, but because the malaria parasite has a complicated life cycle, it's a difficult vaccine to develop.

Table 1. Dosing of antimalarials for presumptive or directed treatment of *P. falciparum* malaria in sub-Saharan African refugees after arrival in the United States

Presumptive Therapies

Table 1. Dosing of antimalarials for presumptive or directed treatment of P. falciparum malaria in sub-Saharan African refugees after arrival in the United States

Medication	Child Dosing ***Children weighing 5 kg to ≤ 35 kg***	Adult Dosing ***Persons weighing > 35 kg***
Atovaquone-proguanil (Malarone™) **(adult tablet = 250 mg atovaquone/100 mg proguanil)** **(pediatric tablet = 62.5 mg atovaquone/25 mg proguanil)**	**5-8 kg:** Two pediatric tablets once a day for 3 days **9-10 kg:** Three pediatric tablets once a day for 3 days **11-20 kg:** One adult tablet once a day for 3 days **21-30 kg:** Two adult tablets once a day for 3 days **31-35 kg:** Three adult tablets once a day for 3 days	Four adult tablets once a day for 3 days

Table 1. Dosing of antimalarials for presumptive or directed treatment of P. falciparum malaria in sub-Saharan African refugees after arrival in the United States

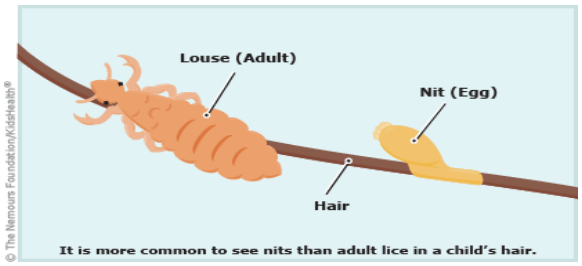
Medication	Child Dosing ***Children weighing 5 kg to ≤ 35 kg***	Adult Dosing ***Persons weighing > 35 kg***
Artemether-lumefantrine (Coartem ™) **(20 mg artemether and 120 mg lumefantrine)**	A six-dose regimen (given at 0, 8, 24, 36, 48, and 60 hours) is recommended with 1 to 3 tablets per dose, depending on body weight: **5 to < 15 kg:** One tablet, then one tablet after 8 hours, then one tablet twice daily (morning and evening) on each of the following 2 days (total course: 6 tablets) **15 to < 25 kg**: Two tablets as a single dose, then two tablets after 8 hours, then two tablets twice daily (morning and evening) on each of the following 2 days (total course: 12 tablets) **25 to < 35 kg:** Three tablets as a single dose, then three tablets after 8 hours, then three tablets twice daily (morning and evening) on each of the following 2 days (total course: 18 tablets)*	A standard 3-day treatment schedule with a total of 6 doses (total course: 24 tablets). Initial dose consists of four tablets, after 8 hours four more tablets (dose 2). Then four tablets twice daily (morning and evening) for the

Chloroquine and Hydroxychloroquine

Information on chloroquine, hydroxychloroquine, and COVID-19 can be found here: https://www.cdc.gov/coronavirus/2019-ncov/hcp/therapeutic-options.html

CDC Chloroquine and hydroxychloroquine are FDA-approved drugs used to prevent and treat certain types of malaria. They have a long elimination half-life of 30–45 days, allowing for weekly dosing when used in prevention of malaria, and a short 48-hour treatment course when used to treat malaria. These drugs are generally well tolerated at doses used for malaria but may cause pruritis and exacerbate psoriasis. With frequent dosing, rarely reported adverse events include retinopathy and cardiac arrhythmias (QT prolongation specifically) in those with liver or kidney dysfunction. Exceeding recommended doses of chloroquine and hydroxychloroquine can lead to death, and fatal overdoses have been reported. Hydroxychloroquine is also FDA approved for use in rheumatoid arthritis and systemic lupus erythematosis. These drugs are available by prescription only

Head Lice



Head lice are tiny wingless insects. They live among human hairs and feed on blood from the scalp.

Head lice are a common problem, especially for kids. They spread easily from person to person, and sometimes are tough to get rid of. Their bites can make a child's scalp itchy and irritated, and scratching can lead to infection.

Head lice are annoying, but they're not dangerous and they don't spread disease. They're not a sign of poor hygiene — head lice need blood and they don't care whether it's from someone who's clean or dirty.

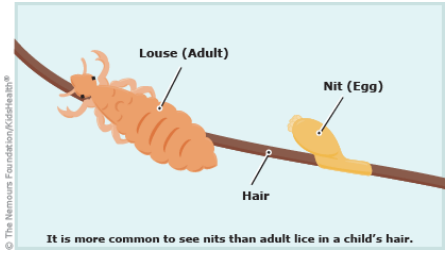
It's best to treat head lice right away to prevent them from spreading.

Signs & Symptoms of Head Lice

Even though they're tiny, you can see head lice. Here's what to look for:

Lice eggs (nits). These look like tiny yellow, tan, or brown dots before they hatch. Lice lay nits on hair shafts close to the scalp, where the temperature is perfect for keeping warm until they hatch. Nits look a bit like dandruff, but aren't removed by brushing or shaking them off.

Unless a child has many head lice, it's more common to see nits in the hair than live lice crawling on the scalp. Lice eggs hatch 1–2 weeks after they're laid. After hatching, the remaining shell looks white or clear and stays attached to the hair shaft. This is when it's easiest to spot them, as the hair is growing longer and the egg shell is moving away from the scalp.



Adult lice and nymphs (baby lice). Adult lice are no bigger than a sesame seed and are grayish-white or tan. Nymphs are smaller and become adult lice about 1–2 weeks

after they hatch. This life cycle repeats itself about every 3 weeks. Most lice feed on blood several times a day, and they can survive up to 2 days off the scalp.

Scratching. With lice bites come itching and scratching. This is due to a reaction to the saliva (spit) of lice. But the itching doesn't always start right away. It depends on how sensitive a child's skin is to the lice. It might take weeks for kids with lice to start scratching. They may complain, though, of things tickling or moving around on their heads.

Small red bumps or sores from scratching. Some kids have mild irritation from scratching, while others may get a bothersome rash. Scratching a lot can lead to a bacterial infection. Watch for swollen lymph nodes (glands) on the back or front of the neck, and red, tender skin that might have crusting and oozing. Doctors can treat a skin infection with an antibiotic.

For parents: How Can I Check My Child for Head Lice?

Look for lice and nits on the scalp, behind the ears, and around the nape of the neck. It's rare for lice to be in eyelashes or eyebrows.

It can be tough to find a nymph or adult louse. Usually, there aren't many of them and they move fast. Look for nits attached to the hair near the scalp. They can look like dandruff or dirt. To tell them apart, pull on the little speck with your fingers — dandruff and dirt can be removed, but nits stay stuck. A magnifying glass and a bright light can help with your inspection.

The best way to check is by using a fine-tooth comb on wet hair. After applying lots of conditioner, comb the hair out in very small sections, and look for lice or nits on the comb. You can wipe the comb onto a tissue or paper towel where it will be easier to see them.

If your child is itchy and scratching their head but you're not sure if it's lice, ask your child's doctor or the nurse at school or childcare center to take a look.

Head Lice's Treatment

The two main ways to treat lice are:

- medicine
- removing by hand

Medicine: In some areas, lice have developed resistance to some medicines. This means they no longer work to kill the lice. Ask your doctor or a pharmacist to recommend a medicine known to work in your area. The doctor also can prescribe a medicated shampoo or lotion. For very resistant lice, the doctor might recommend taking medicine by mouth.

Whether the medicine is OTC or prescription, always follow the directions closely. Applying too much can be harmful. Applying too little won't work.

Removing by hand: Removing lice and nits by hand can finish the job if the medicine did not completely rid your child of lice (no medicine is 100% effective). It is also an option for anyone who doesn't want to use an insecticide. And it is the only option for children 2 months old or younger, who should not use medicated lice treatment.

To do this, use a fine-tooth comb on wet, conditioned hair every 3–4 days for 3 weeks after the last live louse was seen. Wetting the hair temporarily stops the lice from moving, and the conditioner makes it easier to get a comb through the hair.

There's no need to buy electronic combs that claim to kill lice or make nits easier to remove. No studies have been done to back up these claims. You also don't need to buy special vinegar solutions to apply to the scalp before picking nits. Water and conditioner works fine.

Though petroleum jelly, mayonnaise, or olive oil are sometimes used to try to suffocate head lice, these treatments may not work. If medicine doesn't work and you want to try these methods, talk to your doctor first.

A few important things to NOT do: Don't use a hairdryer after applying scalp treatments. Some treatments for lice use flammable ingredients and can catch on fire. **Don't use** pesticide sprays or hire a pest control company to try to get rid of the lice; these can be harmful. **Don't use** essential oils (such as ylang ylang oil or tea tree oil) to treat lice on the scalp. They can cause allergic skin reactions and aren't approved by the U.S. Food and Drug Administration (FDA). **Don't ever use** highly flammable chemicals such as gasoline or erosene on anyone.

Head lice spread quickly from person to person, especially in group settings like schools, childcare centers, slumber parties, sports activities, and camps.

They can't fly or jump, but they have claws that let them crawl and cling to hair. They spread through head-to-head contact, and sharing clothing, bed linens, combs, brushes, and hats.

Pets can't catch head lice and pass them on to people or the other way around.

In the past, kids with head lice were kept home from school. But now doctors don't recommend these "no-nit" policies. In most cases, a child who has lice should stay at school until the end of the day, go home and get treatment, and return to school the next day. While they are at school, kids should avoid head-to-head contact with other kids. It can help to put long hair up in a bun, braid, or ponytail.

Can We Prevent Head Lice?

To get rid of head lice and their eggs, and to help prevent them from coming back:

Wash all bed linens, stuffed animals, and clothing used during the 2 days before treatment (any lice that fell off before that will not be alive). Wash in very hot water (130°F [54.4°C]), then put them in the hot cycle of the dryer for at least 20 minutes.

Dry clean items that can't be washed. Or put them in airtight bags for 2 weeks.

Vacuum carpets and any upholstered furniture (in your home or car), and throw away the vacuum cleaner bag.

Soak hair-care items like combs, barrettes, hair ties or bands, headbands, and brushes in hot water or throw them away. Tell kids not to share these items.

Because lice easily pass from person to person in the same house, check all family members. Treat everyone who has lice so they won't pass it back and forth.

Tell kids to try to avoid head-to-head contact at school (in gym, on the playground, or during sports) and while playing at home with other children.

Every 3 or 4 days, check kids who had close contact with a person who has lice. Then, treat any who have lice or nits close to the scalp.

As many parents know, fighting head lice can be an ongoing battle. There's no doubt that they can be hard bugs to get rid of.

If you've tried everything and your child still has lice, it could be because:

some nits were left behind (if you see nits far from the scalp — more than ½ inch (1 cm) — and no live lice, these are probably dead and treatment likely isn't needed)

your child is still around someone who has lice

the treatment you're using isn't effective

If your child has lice 2 weeks after you started treatment or if your child's scalp looks infected, call your doctor.

There are professional lice treatment centers that remove lice and nits for a fee. These services are effective but often costly.

For Parents

Remind your child that while having lice can be embarrassing, anyone can get them. Having head lice is not a sign of dirtiness or poor hygiene. The pesky little bugs can be a problem no matter how often kids do — or don't — wash their hair or bathe.

Dealing with head lice can be frustrating, but be patient. Follow the treatments and prevention tips from your doctor, and soon your family will be lice-free.

Athlete's Foot

Athlete's foot is a type of fungal skin infection. Fungi (the plural of fungus) are microscopic plant-like organisms that thrive in damp, warm environments. They're usually not dangerous, but sometimes can cause disease. When they infect the skin, they cause mild but annoying rashes. Fungal skin infections are also known as **tinea infections**.

When fungus grows on the feet, it is called athlete's foot (or **tinea pedis**). It got this name because it affects people whose feet tend to be damp and sweaty, which is often the case with athletes. But anyone can get this infection.

Signs & Symptoms of Athlete's Foot

Athlete's foot usually causes redness, flakiness, peeling, or cracking of the skin on the feet. It may itch, sting, or burn, or simply feel uncomfortable.

It's usually on the soles of the feet, the areas between the toes, and sometimes the toenails. When the toenails are involved they become thick, white or yellowish, and brittle.

Causes of Athlete's Foot

Athlete's foot is caused by fungi that normally live on the skin, hair, and nails called **dermatophytes**. When the environment they live in gets warm and moist, they grow out of control and start to cause symptoms.

Is Athlete's Foot Contagious?

Yes. It spreads in damp environments, such as public showers or pool areas. It can also spread to other areas of the body if a person touches the affected foot and then touches other body parts, such as the hands.

Waking around barefoot in warm wet places like locker rooms or public pools can expose the feet to fungi that thrive in those environments. Sweaty shoes and socks add

to the dampness and can make the infection worse. Sharing towels, sheets, clothing, or shoes with someone who has athlete's foot also can spread the infection.

Athlete's Foot Diagnose

A doctor can often diagnose athlete's foot just by looking at it and asking questions about the symptoms and the child's lifestyle. Sometimes the doctor will want to scrape off a small sample of the flaky infected skin to look at under a microscope or to test in a laboratory.

Athlete's Foot Treatment

Over-the-counter (OTC) antifungal creams, sprays, or powders may solve the problem if it is mild. More serious infections may need prescription medicine, either topical (applied to skin) or in pill form.

Whatever treatment is used, child should use it for as long as is recommended, even if the rash seems to be getting better. If not, the infection can come back. Some people regularly use medicated foot powders and sprays to prevent this from happening.

Most mild cases of athlete's foot clear up within 2 weeks. But treatment can go for several weeks or longer if the infection is more serious or affects the toenails.

Athlete's Foot Prevention

Athlete's foot often can be prevented. To avoid it, kids should:

Keep feet clean and dry by washing them daily and drying them completely, especially between the toes. (Use a clean towel and avoid sharing.)

Wear waterproof shoes or flip-flops when walking around in locker rooms, public showers, and public pool areas.

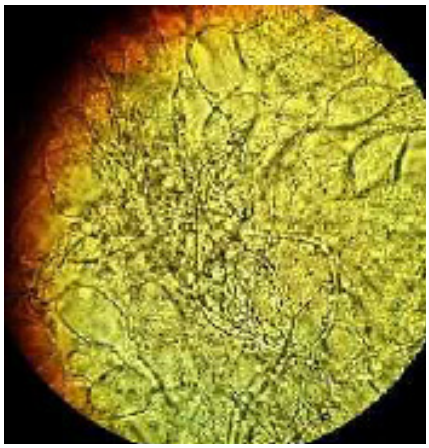
Switch between wearing shoes or sneakers to prevent the build-up of moisture. Choose ones that are well-ventilated with small holes to keep the feet dry.

Avoid socks that trap moisture or make the feet sweat. Instead, choose cotton or wool socks or ones made of fabric that wicks away moisture.

Change socks regularly, especially if the feet get sweaty.

Use a powder on the feet every day to help reduce sweating.

Yeast infections



is caused by candida), a common fungus that is found on everyone's body.

When babies get diaper rash, it may be a yeast infection.

Kids get yeast infections, usually in warm, moist parts of their bodies including under their arms, in their mouths, or in the groin area. Girls can get it in their vaginas.

Yeast infections may make white spots in the mouth or cause a red rash, pain, or itching.

Kids with yeast infections can use a cream or take medicine to feel better.

Vaginal Yeast Infections

Yeast infections (also known as candidiasis) are common infections caused by *Candida albicans* yeast, which is a type of fungus. Yeast infections usually happen in warm, moist parts of the body, such as the mouth, and moist areas of skin.

A yeast infection in the vagina is known as vulvovaginal candidiasis. Vaginal yeast infections are common among growing girls, and about 75% of all females will have one at some point.

Signs and Symptoms of Vaginal Yeast Infections

Vaginal yeast infections can cause pain, itching, redness, a thick white vaginal discharge, pain during urination (peeing), and sometimes whitish patches on the skin of the vaginal area.

If your daughter has a vaginal yeast infection, her doctor can prescribe treatment to clear up the symptoms in a couple of days and cure the infection within a week.

Causes of Vaginal Yeast Infections

Having small amounts of *Candida* on the skin and inside the mouth, digestive tract, and vagina is normal. A healthy immune system and some "good" bacteria keep the amount in a person's body under control.

But yeast in the vagina can sometimes "overgrow" and lead to symptoms of a yeast infection. This can happen if:

A girl's immune system is weakened (from an illness or medicines like chemotherapy.

A girl takes antibiotics for a bacterial infection (such as strep throat) (the antibiotics can kill off the "good" bacteria that keep the *Candida* in check).

A girl has high blood sugar. Girls whose diabetes isn't well-controlled are more likely to get yeast infections.

A girl wears clothing (especially underwear) that's too tight or made of materials like nylon that trap heat and moisture.

As girls mature and go through puberty, hormonal changes can put them at risk for yeast infections — sometimes, girls get yeast infections right before their menstrual periods. Pregnant women are also more prone to yeast infections.

Young girls who haven't gone through puberty yet are less likely to get yeast infections, but they can happen. So if young daughter complains of itching or discomfort in her vaginal area,

Yeast infections can happen to any girl, and they're not considered sexually transmitted infections, although they may be able to be spread from one sexual partner to the other.

Vaginal Yeast Infections' Diagnose

If girl has any symptoms of a yeast infection — like itchiness or abnormal vaginal discharge — she should see her doctor or gynecologist. Other infections can cause similar symptoms but require different treatments.

The doctor might take a urine sample to rule out a urinary tract infection (UTI) and swab some vaginal discharge to examine under a microscope.

Vaginal Yeast's Infections Treatment

If your daughter does have a yeast infection, her doctor can prescribe a medicine to take by mouth or a vaginal cream, tablet, or suppository that will quickly clear up the symptoms in a few days and the infection within a week.

Anyone using a vaginal treatment should not have sex until the infection is completely cleared — these medicines can weaken condoms and diaphragms.

If your daughter is not feeling better within a few days of finishing treatment, call the doctor.

Can Vaginal Yeast Infections Be Prevented?

For most girls, there's no way to prevent yeast infections. Girls may feel more comfortable and have less irritation if they wear breathable cotton underwear and loose clothes and avoid vaginal sprays and douches. But there's no scientific proof that doing these things prevents yeast infections. If your daughter has diabetes, keeping her blood sugar levels under control will help her avoid getting yeast infections.

Don't give her leftover antibiotics or someone else's antibiotics or medicine because they be the wrong. taking antibiotics when they are not needed can make yeast infections more likely.

Treatment

Treatment for yeast infections depends on the severity and frequency of your infections.

For mild to moderate symptoms and infrequent episodes, your doctor might recommend:

Short-course vaginal therapy. Taking an antifungal medication for three to seven days will usually clear a yeast infection. Antifungal medications — which are available as creams, ointments, tablets and suppositories — include miconazole (Monistat 3) and terconazole. Some of these medications are available over-the-counter and others by prescription only.

Single-dose oral medication. Your doctor might prescribe a one-time, single oral dose of fluconazole (Diflucan). Oral medication isn't recommended if you're pregnant. To manage more-severe symptoms, you might take two single doses three days apart.

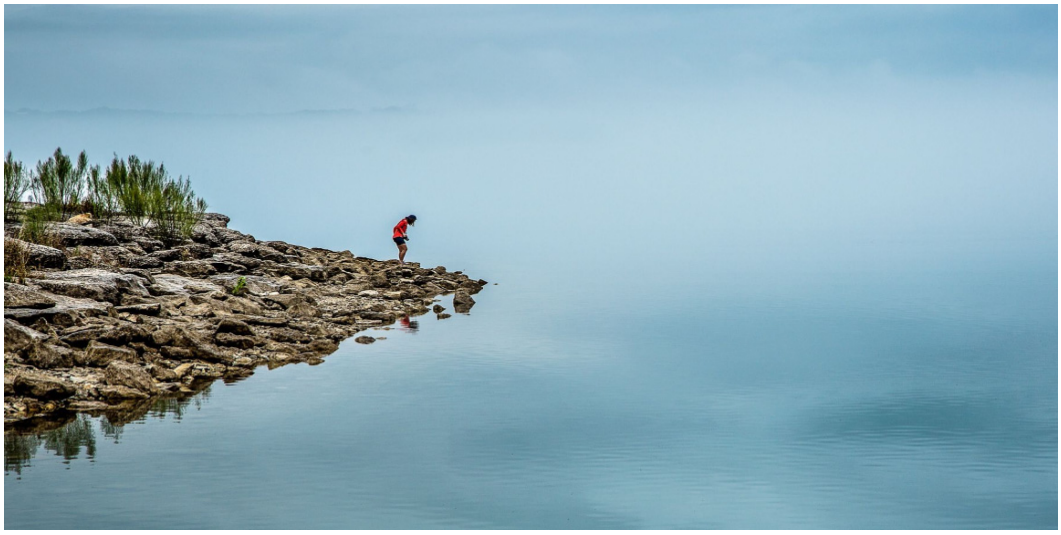
See your doctor again if treatment doesn't resolve your symptoms or if your symptoms return within two months.

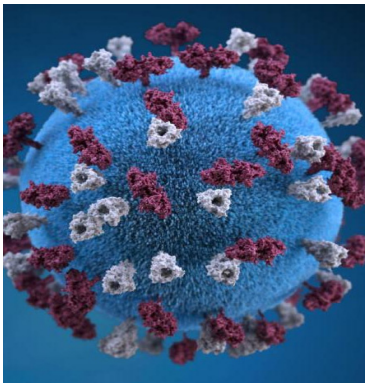
If your symptoms are severe, or you have frequent yeast infections, your doctor might recommend:

Long-course vaginal therapy. Your doctor might prescribe an antifungal medication taken daily for up to two weeks, followed by once a week for six months.

Multidose oral medication. Your doctor might prescribe two or three doses of an antifungal medication to be taken by mouth instead of vaginal therapy. However, this therapy isn't recommended for pregnant women.

Azole resistant therapy. Your doctor might recommend boric acid, a capsule inserted into your vagina. This medication may be fatal if taken orally and is used only to treat candida fungus that is resistant to the usual antifungal agents.





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